THE MODEL ENGINEER

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SEPTEMBER 24th 1953
Vol. 109 No. 2731

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THE MODEL ENGINEER

EVERY THURSDAY

Volume 109 - No. 2731

SEPTEMBER 24th 1953

ESTABLISHED 1898

PERCIVAL MARSHALL & CO. LTD. 19-20 NOEL STREET · LONDON · W·1

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Our Cover Picture

Our photograph was taken at the recent "M.E." Exhibition and shows the radio controlled Cabin Cruiser *Geebaa*, built by Mr. H. R. Clayton, which was frequently to be seen operating on the tank. The model responded to the remote control perfectly, being able to turn, stop or reverse at the will of the operator. She was often used for towing balloons and leaving them at various positions in the tank, and then proceeding to burst them one by one! This is a very shapely model and the hull is a lovely piece of craftsmanship. The radio apparatus is very well planned and the layout of both this and the electric propulsion motor in the hull is an example of what such an installation should be. The young lady in the photograph is one of our Editorial secretaries, and it is obvious from her expression that her interest in ship models is not confined to her office work.

SMOKE RINGS

Prototype Model Power Boats

THE MODELLING of marine craft of all types, both sail and power, is a very important department of model engineering, the popularity of which is proved by the number and quality of exhibits in this class at the "M.E." Exhibition. Without making any odious comparisons between non-working and "live" models, it cannot be denied that there is an added charm about a model which is capable of performing efficiently and realistically in its native element, but doubts are sometimes expressed as to whether some of the boats described as working models in the Exhibition would create a good impression if called upon to do so. One point which arises in the construction of a working model marine vessel is that if it is really intended to fulfil its true function it must be robustly built, and this raises the question of how much delicate detail work can be put into the superstructure and deck fittings. Model power boats, in particular, are subject to rough usage, especially if constantly run in the regattas which take place almost weekly throughout the season. As a result, they are rarely super-detailed, and such boats are not often entered in the "M.E." Exhibition, as it is thought that their chances of success against well-finished accurate scale models are somewhat remote. This is to be deplored, and there is a strong case for more emphasis on performance when judging models of this type. The Model Power Boat Association, in their annual Prototype Competition, have an admirable system of judging in which all factors, including scale accuracy, seaworthiness, realism when running, and plant efficiency, are taken into consideration. It is, perhaps, rather difficult to apply this system at the "M.E." Exhibition, and no criticism of the present method of judging is implied, but it would be a good thing if something could be done to encourage the constructors of the many boats built for real work to show them at the Exhibition.

British Engineering Progress

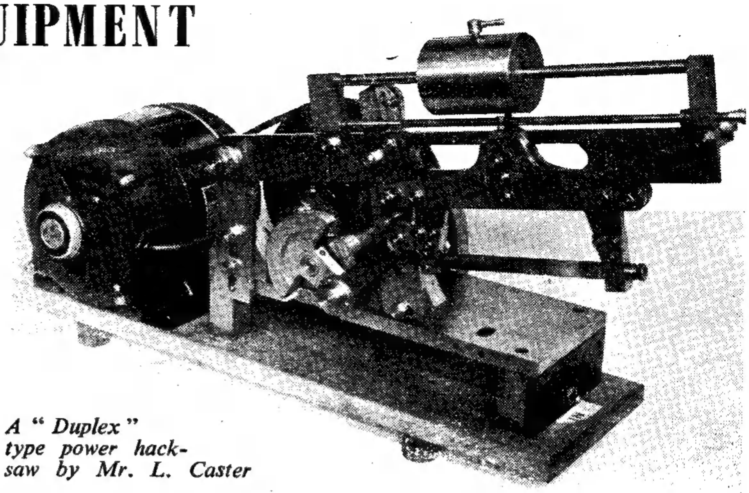
AT THE Engineering, Marine and Welding Exhibition held recently at Olympia, the most striking feature was the evidence of rapid improvement, not only in engineering design, but also in industrial technique and manufacturing processes. While it may be true to say that there is no change in basic engineering principles and methods, their mode of application, and the form of equipment employed, are changing from year to year, in the quest for still higher efficiency, both in production and performance. Significant developments at this year's Exhibition include the advent of the gas turbine as a practical power unit, not only in high power installations, but also compact units of medium power, which may prove to be a serious competitor to piston engines in the near future; the improvements in methods of casting both large and small objects, to obtain uniformity of quality and precision in form and accuracy; the bold advances in the application of metallurgical science, and methods of fabricating or machining metals which were hitherto considered too difficult for extensive industrial use; and the complete mechanisation of industries which formerly relied largely on laborious old-fashioned methods.

All this is surely a healthy augury for the future of the engineering industry, which despite the many difficulties which have beset its path in recent years, has never failed to maintain consistent progress.

The Exhibition cannot fail to inspire confidence both in the enterprise of British manufacturers and the skill of British craftsmen, which well uphold the ancient traditions for which the industries of this country are justly famous.

TOOLS and EQUIPMENT at the "M.E." EXHIBITION

By E. T. Westbury



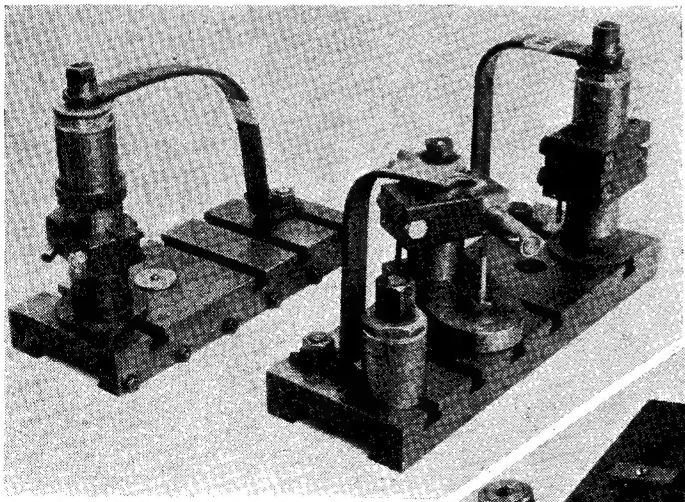
A " Duplex " type power hack-saw by Mr. L. Caster

BOTH in respect of numbers and quality, the exhibits in this section failed to reach the standard which has been attained at some of the previous exhibitions, and it is to be regretted that the new challenge trophy donated by Mr. A. E. Bowyer-Lowe could not be awarded. This is all the more surprising in view of the fact that information is available on the construction of a wide variety of workshop appliances, and to judge by the interest shown in this subject among readers of THE MODEL ENGINEER, it would seem that this class of work enjoys a wide popularity.

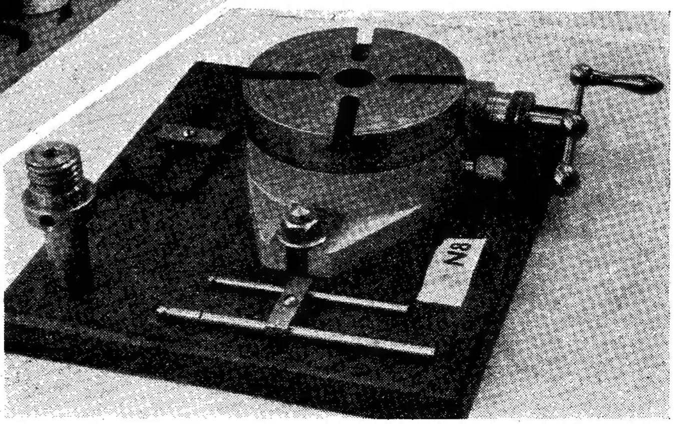
Among appliances constructed to designs published in THE MODEL ENGINEER, the most noteworthy was the power hacksaw by Mr. L. Caster. This was of the type described by " Duplex," and was nicely made, though not aspiring to any special distinction; from the practical angle, it would appear to be a serviceable and efficient appliance, which is no doubt what it was primarily intended to be, rather than a show piece.

Another exhibit to which these comments equally apply was Mr. H. A. C. Hunt's 4-in. rotary table, which was constructed to the design of Mr. Richmond published some years ago in THE MODEL ENGINEER. The dividing and numbering on this appliance were very neatly executed, and the only point which seemed open to any particular criticism was the " feel " of the worm gearing.

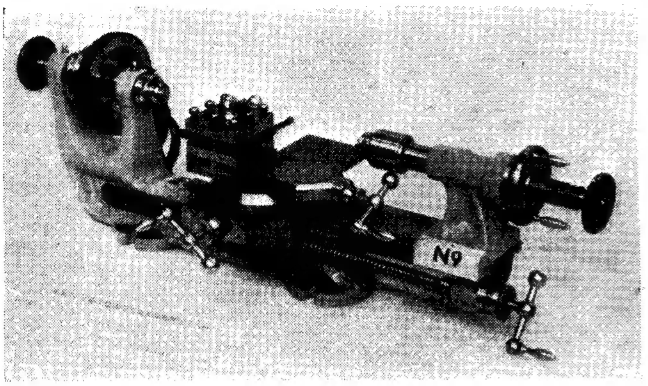
The lathe milling attachment by Mr. D. P. Winks followed the well-known G. P. Potts design, incorporating the milling spindle with draw-in collets, mounted on a cylindrical vertical-slide and furnished with jockey pulleys to guide the belt from an overhead shaft or other source of power. This type of attachment is typical of that which



Mr. Johnstone Pratt's interchangeable toolposts



Right—A 4 in. rotary table by Mr. H. A. C. Hunt



Mr. J. P. Russell's miniature model-making lathe

Right—Bench countershaft unit for "Zyto" lathes

is employed in hundreds of model workshops, and as in the previous cases, may be regarded as useful and practical, though not noteworthy either in design or execution.

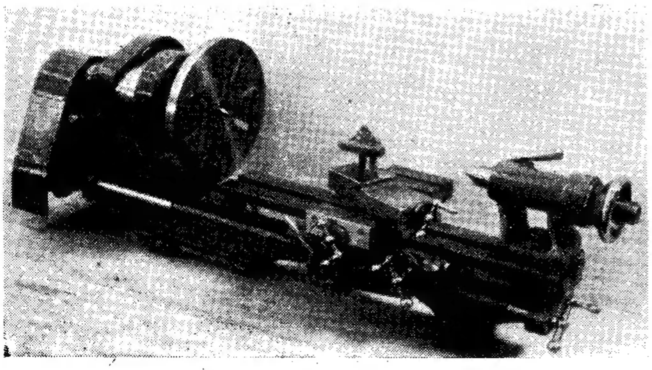
A different aspect was presented by the group of interchangeable toolposts by Mr. Johnstone Pratt, in which the principal claim to merit was originality of design. These comprised special holders for turning and boring tools, arranged to clamp on a vertical pillar mounted either on the top-slide, or directly on the cross-slide. This method of mounting is not uncommon in small lathe practice, having been used on the Drummond and Myford "M" type lathes, and has been adapted to take various forms of tool holders; its principal merit is that it provides a ready means of tool height adjustment.

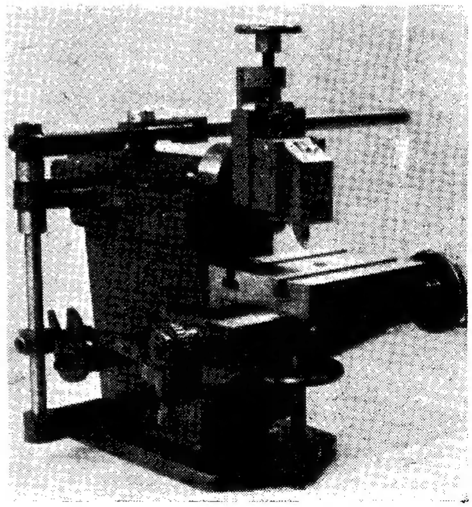
In the heavier type of holder, designed to take a square tool on one side and a round one on the other, the latter employs a vee-groove for locating the tool, but instead of allowing the latter to bed down in the vee in the usual way, it is arranged to make contact with only one side of the vee, and the inner face of the tool slot. This gives a powerful wedging action to secure the tool, but only when the shank of the latter is of the specified diameter (½ in.). Personally, we have never found any difficulty in holding tools in the normal form of vee-grooved holder, which will deal equally well with a wide range of sizes, but the designer of this device evidently believes in "security doubly secure."

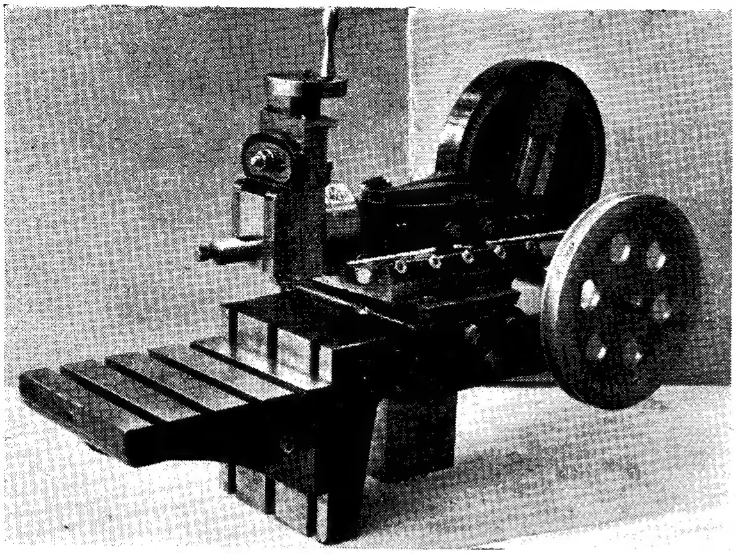
A spherical turning toolholder of the lever-feed type, embodying the same kind of vertical pillar mounting, was included, also a centre-height gauge which could be slipped over the pillar to locate the tool point before clamping the holder. Yet another feature was the set of three overhead stays for resisting deflection of the pillars on heavy cuts; their effectiveness might be considered open to criticism in view of the fact

Below—Messrs. S. Tyzack & Son's new long bed "Zyto" lathe

Right—The new Buck & Ryan pedestal hand shaper.







The power-driven "Adept" shaper

that they are made of bent steel bar. All the fittings can be interchanged, the long pillars being secured on the cross-slide by a tee-bolt through the centre, while the short one fits the top slide stud as employed on Myford and many other lathes.

Ingenuity was displayed in the dial test indicator set by Mr. H. J. Sales; the indicator movement was well made and worked very smoothly. No attempt was made by the judges to check the accuracy of the scale readings, but this point is relatively unimportant from the practical aspect, as these instruments are mainly used by model engineers for comparative rather than absolute measurements. The fittings for clamping the indicator to a scribing block or machine tool were of orthodox design, and well made and finished; they deserved housing in a case more in keeping with their quality.

A Small Lathe

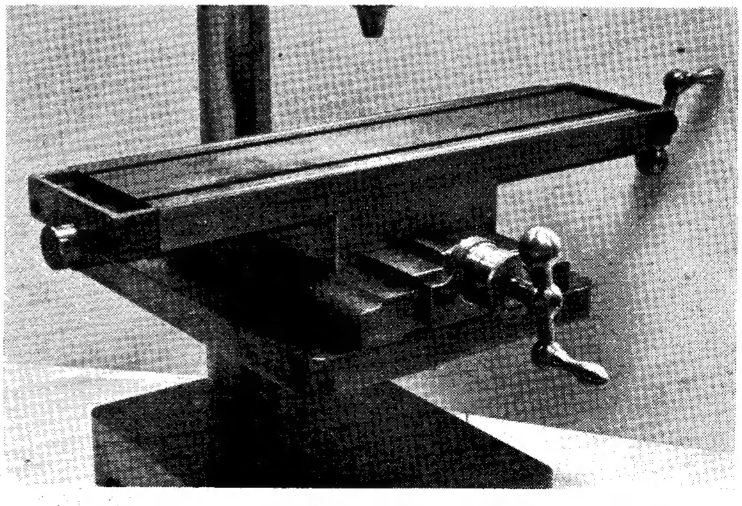
It was perhaps a little unfortunate that the exhibit by Mr. J. P. Russell was described on the entry form as a watchmaker's lathe, for although it is obvious that it could have been used for many operations within the sphere of watchmaking, its design and equipment were not in keeping with that accepted as orthodox for this specialised class of tool. In fact, the general form of design resembled closely that of several miniature model-making lathes, though not identical with any known type, and having one or two refinements which were not missed by the judges. The headstock was integral with the bed, and had half-split bearings, both of which features are foreign to horological lathes; other discrepancies were the use of a screw-feed tailstock and a four-way turret toolholder. Both saddle and tailstock feed operated in the reverse order to that normally employed on small engineering lathes, and though this feature is not without precedent in machine tool practice, it is one which has been known to cause disaster in the hands of an operator used to orthodox practice. Draw-in collets were fitted to the hollow mandrel and the tailstock; the workmanship and finish, including the fitting of the slides, were very good, and there was every indication that the machine should be capable of accurate work.

Open to Criticism

In the drilling machine by Mr. T. H. Lund, most of the usual features of the type of tool popular among amateur constructors were present, including the use of a round steel pillar to carry the table support and the spindle head, sensitive lever feed, and jockey pulleys to take the drive from a horizontal countershaft. Quite a few details both in the design and execution of this machine were, however, open to criticism, such as the use of two separate arms clamped on the pillar to carry the spindle bearings; this makes the bearing alignment difficult and introduces a risk that the spindle may get out of parallel. A torsion return spring was used on the feed lever, necessitating the use of a sliding block, which could possibly affect sensitivity. An unusual device for carrying and adjusting the alignment of the jockey spindle was employed, in the form of a rectangular strip fixed obliquely at the back of the head, with a slide to carry the spindle adjustably mounted on it.

Trade Section

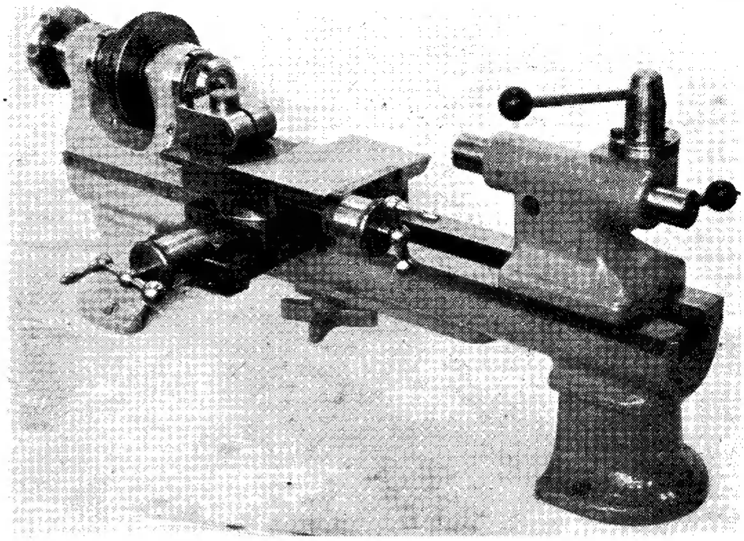
The tools and equipment on the trade stands included, as usual, several interesting items; while there was not a great deal which could be described as actually new,



A slide-rest attachment for the Cowell ½ in. drilling machine

there have been developments in several types of well-established machine tools and accessories which show that progress is well maintained.

The range of " Zyto " lathes by Messrs. S. Tyzack & Son, Ltd., has been augmented by the introduction of a new long bed version of the 3⅜ in. back-geared screw-cutting lathe, admitting 16 in. between centres, with a specially long cross-slide, providing extra traverse range, and gear guards. In other respects, this machine follows the same specification as the 12-in. bed model, having hollow mandrel and tailstock, with sockets to take No. 1 and 2 Morse taper centres respectively; the swing radius over the cross-slide is 2 in., and in the gap, 4½ in. The "Zyto" lathes are among the cheapest fully-equipped screw-cutting lathes on the market, and satisfy a very popular demand among model engineers whose incomes and accommodation facilities are alike limited.



Messrs. E. W. Cowell's instument maker's lathe

Bench Motorising Unit

Messrs. Tyzack have also introduced a new bench motorising unit, specially suited to " Zyto " lathes, but also adaptable to other machine tools. It comprises a countershaft bracket, with motor-mounting platform, hinged to the baseplate, with a slotted strut to adjust belt tension. At present the 3-step cone pulleys are made only to take ⅜ in. flat belt, but we understand that provision for vee-belt drive will also be provided.

On the Myford stand, no new features in machines or equipment were found, as the demand for both M.L.7 and Super 7 lathes has taxed the capacity of the works to the utmost during the past year, but the demonstrations of wood and metal working machinery on this stand were as popular as ever, and access to it was often difficult on account of the crowds around it. Myford lathes were also encountered on other trade stands, not to mention those on the demonstration stands, which kept up a non-stop performance throughout the period of the exhibition.

Tools Galore

In addition to the usual encyclopaedic array of tools and equipment which is always to be found on Messrs. Buck and Ryan's stand, two new shaping machines appeared this year. The first was a heavy-duty hand machine, which differed from most machines in this class by having a traversing table instead of the usual traversing head, and also a massive pedestal mounting. It has a maximum stroke of 6½ in., cross-traverse of 7 in., vertical traverse 4½ in., and swivelling tool slide traverse of 1⅛ in. An automatic cross feed is provided, to operate in either direction, and adjustable for increment of feed per stroke. The total weight is approximately 107 lb.

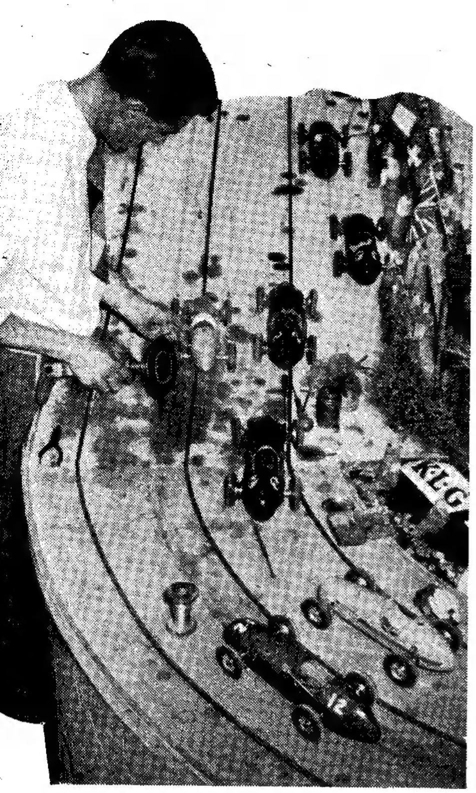
The other machine is a power-driven version of the well-known Adept No. 2, having a vee-belt drive and spur reduction gear to a slotted crank which permits adjustment of stroke from zero to a maximum of 6¼ in. Position adjustment of the ram is provided by a slotted slide for the wrist-pin of the connecting-rod. Three rates of automatic cross feed in either direction can be obtained. This machine is supplied complete, or alternatively, the power drive attachment can be fitted to existing Adept No. 2 hand shapers.

Machine Tools

The machine tool products of Messrs. E. W. Cowell have attained a very high reputation among model engineers, especially as it is possible to obtain castings for constructing them in the home workshop. This year, the sample display exhibit included two drilling machines, one of ⅜ in. and the other of ½ in. capacity, the latter having, as an auxiliary fitting, a compound slide attachment for the table, which enables it to be used for light vertical milling operations. The 6 in. hand shaping machine illustrated in our preliminary review was also shown, together with the 2½ in. plain lathe, which is a well-designed and serviceable tool for instrument and horological work, having a headstock with double cone bearings and draw-in collets, a rack feed tailstock, and a compound slide-rest with indexed feed-screws.

Among the demonstrations of machine and hand tools on various trade stands, those by Messrs. Spiral Saws, Ltd., and Black and Decker deserve special mention. The products of these firms have already been described in our preliminary review of the exhibition. Messrs. H. D. Murray Ltd., the manufacturers of " Reliance " tools, gave a service which was much appreciated by many visitors in demonstrating the art of drill grinding with the aid of the well-known " Reliance " jig. Among other tools on this stand, the thread dressing tool, which is made to suit a wide range of Whitworth and B.S.F. pitches, deserves to be more widely known; it can be used either by hand or in the lathe, to restore burred or damaged threads on work of any size.

Specialities in hand tools included the well-known taps and dies by Messrs. Kennion Bros., which have recently been augmented by some useful new lines, to which we hope to refer in greater detail in a later issue.



Mr. Rex Hays' assistant tuning up model racing cars on the Grand Prix track

MODEL CARS

at the "M.E" Exhibition

By Geoffrey Deason

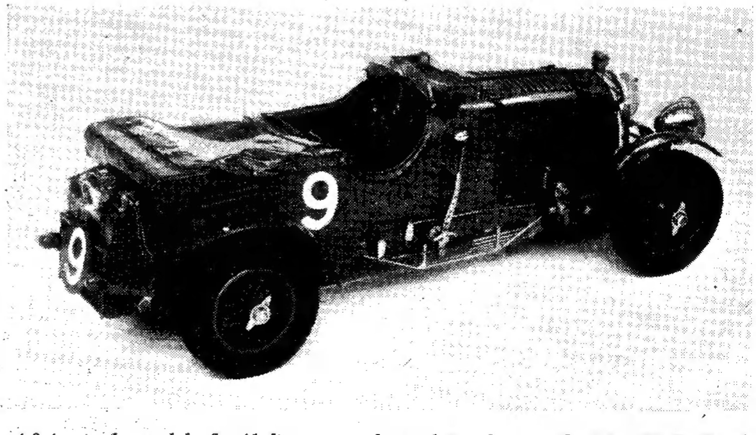
FOR the first time, since model car racing became a hobby in its own right, Class "M," for Racing Cars (Self Propelled) was represented in the exhibition catalogue by two sad little words, "no entries." Whilst I was digesting this unpalatable fact, and wondering if a printers' error had crept in, I was all but swept off my feet by a surge of massed humanity on its way to grab the best places along the rails of the Grand Prix circuit, due to demonstrate in ten minutes time. It was all too easy, therefore, to formulate the thought that cable-track racing must be on its way out, ousted by this undeniably attractive successor! But what an unjust and inaccurate conclusion, when cable meetings are drawing regular entries that wouldn't shame the bigger club "do's" at Silverstone, Goodwood or Snetterton! Indeed, particularly in the popular small classes, the rush of competitors frequently leads to cancellation of second runs in many open meetings, which speaks for itself where the health of the game is concerned. Let us, however, leave this curious contradiction until a little later, and meanwhile take a look at this circuit-racing business.

For this year's exhibition Rex Hays's magnificently staged racing circuit had been shortened, by eliminating the "mountain" section which previously spanned the side exit doors, to give a lap of some 190 ft. Easier, certainly, than last year's Targa Florio in miniature, but still, in my opinion, the most difficult and testing rail circuit yet devised, and by far the most fascinating, both scenically and from the viewpoint of technical interest. The fast downhill approach to a really severe corner was retained, in addition to a clutch teaser of a gradient on the back straight, and these set problems which were apt to be overlooked by the casual spectator, and caused the knowledgeable to assume curious crouching attitudes as they watched with critical eye the performances of individual cars at known danger-spots.

As he described in his article in the issue of August 13th, Rex Hays was pinning his faith on the sliding shoe type of front guide, following successful experiments during last year's session, each of his teams of cars being so equipped. This fitment seemed to justify itself fully, there being no visible tendency to leave the rail at points of sharply changing gradient, and it has the added advantage of being less conspicuous than the more usual rollers. Lap times appeared to vary from 8 to 10 seconds, creditable indeed on so sinuous a course.

The three teams, Ferrari, Gordini and H.W.M. were this year augmented by the equally immaculate Formula 1 Alfa Romeo, the construction of which was described in these pages some time ago. There is little need to stress the fine workmanship in these models, coming as they do from the workshop of a model craftsman and motoring enthusiast with an international reputation. Suffice to say that they are powered with Frog "150" diesel motors, driving direct on the rear wheel through light centrifugal clutches. Scale and body outline are beyond reproach, and there is sufficient detail included to satisfy the eye, commensurate with practical and continuous operation under arduous conditions. The track setting matches the cars, and all the colour and indefinable atmosphere of the Grand Prix circuit is there, from the pits and score-board, warning signs, fencing and typical race crowd, to the inevitable old Bentley in the paddock.

It was a happy thought to invite



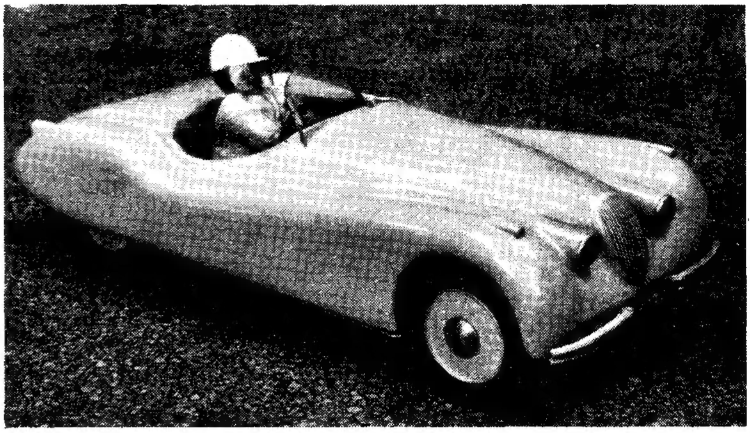
A $\frac{3}{4}$ in. scale model of a $4\frac{1}{2}$ litre supercharged Bentley car, by Mr. W. R. Finch

the North London S.M.E.'s car section to participate in guest races, and some interesting comparisons were possible. Chris Thorpe, the section's energetic leader, had a galaxy of models running, including a charming little two-seater M.G., complete with driver and passenger, which was impressively reliable. This car, together with other club models, was powered by an E.D. Bee, those members not using this unit mostly relying on the neat little three-port 1 c.c. engine which Arthur Weaver designed primarily for club construction and use in circuit racers. W. W. Ransom, the society's secretary, is another builder-user of this engine, fitted in a well finished model of an unusual prototype, the 500 c.c. Rhiando Trimax. A model which rather stole the show whilst in action was A. E. Dowell's handsome XK 120 Jaguar, with a well-executed panel-beaten body. Power in this case was provided by an L.D. Bee, set in the tail with rearward-inclined cylinder, and driving through home-cut spur gears. Its performance was excellent, despite a tendency to self-strangulation when running with the boot lid in place, a point which judicious venting of the underpan should overcome.

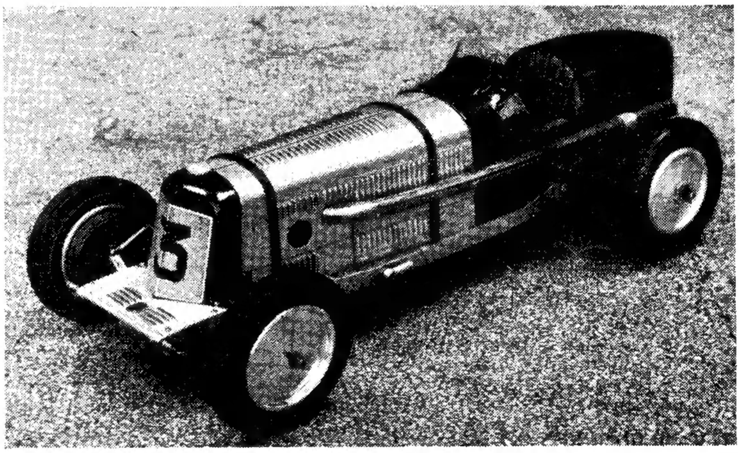
Fastest visiting car was probably Arthur Weaver's little yellow Grand Prix Special, in which his own engine lies horizontally across the frame, drive being through conventional bevels. With its good lines and low build, this model was quite something to watch, lapping in under 8 sec.

Small wonder, then, that with these attractions the "M.E." Circuit was so popular a feature of the exhibition, which will undoubtedly give a considerable fillip to this branch of the hobby. It should provide valuable propaganda for the greatly increased scope which circuit racing offers, particularly to clubs with mixed interests. The engine tuner, the car constructor, the architectural and scenic expert and the experimental wizard all have their part to play, and in this latter connection, mention should certainly be made of the ingenious electric lap scorer devised by the Science and Research section of the North London S.M.E., which was on view on the latter's stand. I have seen this clever and much-needed piece of apparatus in operation at the club track, and can vouch for its efficiency. It is the work of Messrs. Wuidart and Raxworthy, and is a typical example of the co-operative spirit in which this organisation works.

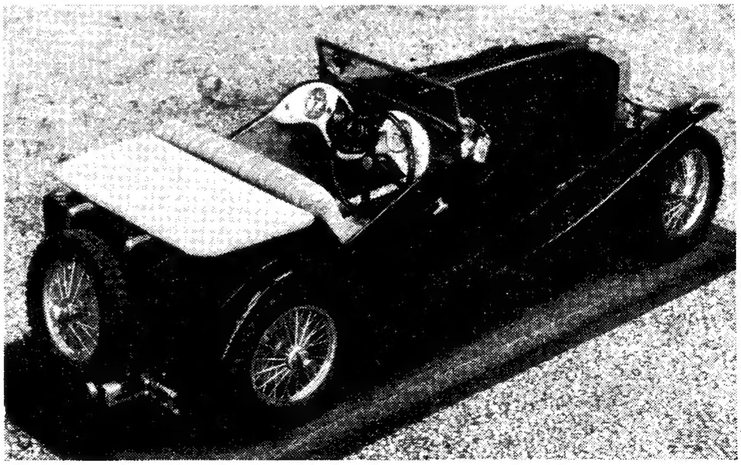
(*Continued on page* 366)



Mr. A. E. Dowell's 1 *c.c. XK* 120 *Jaguar model, fitted for rail-track racing*



Mr. A. F. Weaver's veteran model E.R.A. car, powered by his own 5 *c.c. petrol engine*



A powered model M.G. car by Mr. C. Thorpe on the North London S.M.E. stand

MAKING SMALL BORING TOOLS

By "Duplex"

WHEN an exactly central and truly axial hole has to be machined in a piece of work held in the lathe chuck, there is often the temptation to save time by trusting to a drilling operation from the tailstock for an accurate result. Although, with care, this may nearly always happen, there comes a time when for some reason the drill runs out of line and the work is spoilt.

Apart from using a D-bit, started in a hole centred at its mouth with a boring tool, the rational way of ensuring an accurate bore of the exact diameter required is to carry out the final machining with a boring tool.

There is, however, often the difficulty that no boring tool small enough for the job is available. To make good this deficiency, a few tools can easily be made to deal with any work likely to be encountered.

Material will be saved, and the toolmaking will be simplified, if the tools themselves are made in the form of tool-bits for mounting in a rigid tool-holder.

The Tool-holder

The tool-holder illustrated in Fig. 1 enables the tool-bit to be set with the least possible amount of overhang, and a further advantage of the T-form of holder is that, in the Drummond lathe at any rate, the tool can be fed up to the lathe centre-line without having to set over the top-slide. Moreover, the tool-bit can be rotated in the holder for altering the amount of top-rake. Small tools will be given sufficient support when gripped in a holder made from $\frac{1}{2}$ in. square mild-steel and, as shown in the drawing, the height of the shank is reduced to $\frac{3}{8}$ in., or so, to enable it to be held in the top-slide turret when packed up to centre height on a $\frac{1}{8}$ in. strip.

After a length of square steel has been filed true to give the holder a flat seating in the toolpost, the material is marked-out in accordance with the drawing and the three holes shown are drilled. The tool housing should be reamed to the finished size, and care must be taken to avoid bell-mouthing the hole. The hole for the clamp-screw is then tapped after being opened out to the clearing-size as far as the centre-line. Next, the holder is mounted on its side in the lathe toolpost and the end is slit with a circular slitting-saw, mounted on an arbor supported by the tailstock centre. The $\frac{1}{4}$ in. B.S.F. clamp-screw is then fitted, and a handled box-spanner to correspond should be added to the equipment and kept handy near the lathe.

Making the Tool-bits

The smallest tool for use in the holder can be made from $\frac{3}{16}$ in. diameter silver-steel rod, and the stages in the machining and filing to shape are shown in Fig. 3. The shank of the tool immediately behind the point is reduced in diameter to $\frac{1}{8}$ in., or so, leaving the

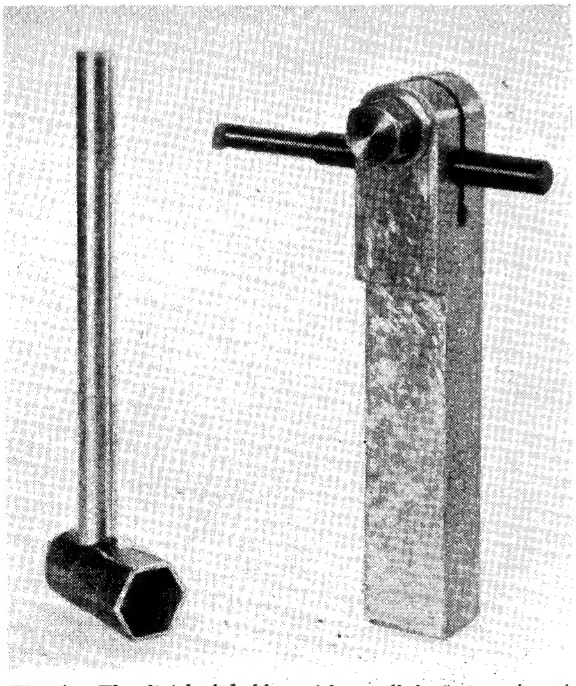


Fig. 1. The finished holder with small boring tool and spanner

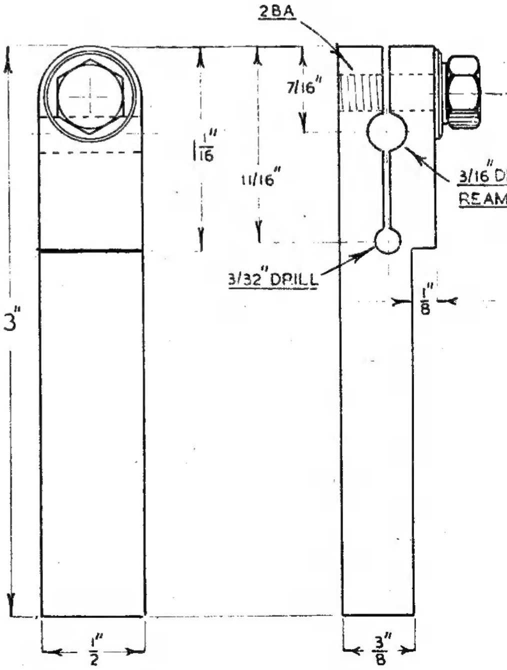


Fig. 2. Details of the toolholder

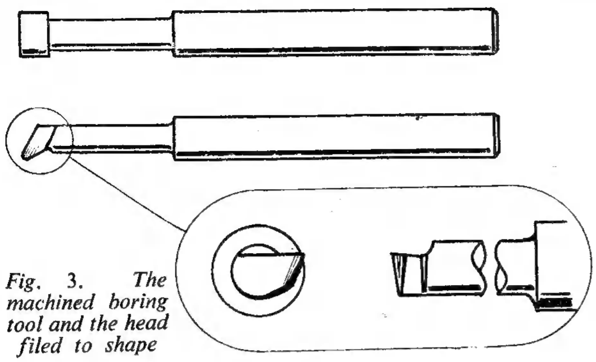


Fig. 3. The machined boring tool and the head filed to shape

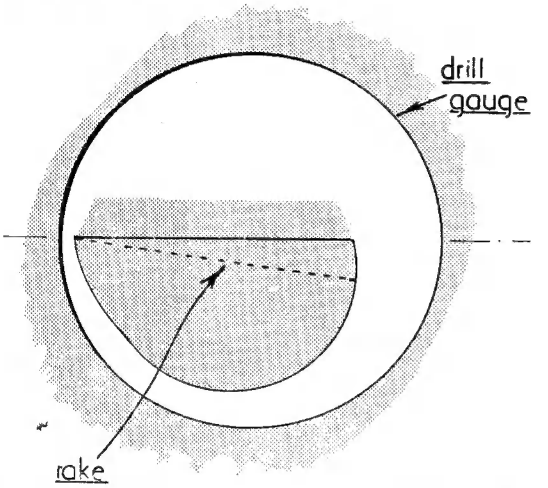


Fig. 4. Checking the clearance below the cutting edge in the drill gauge

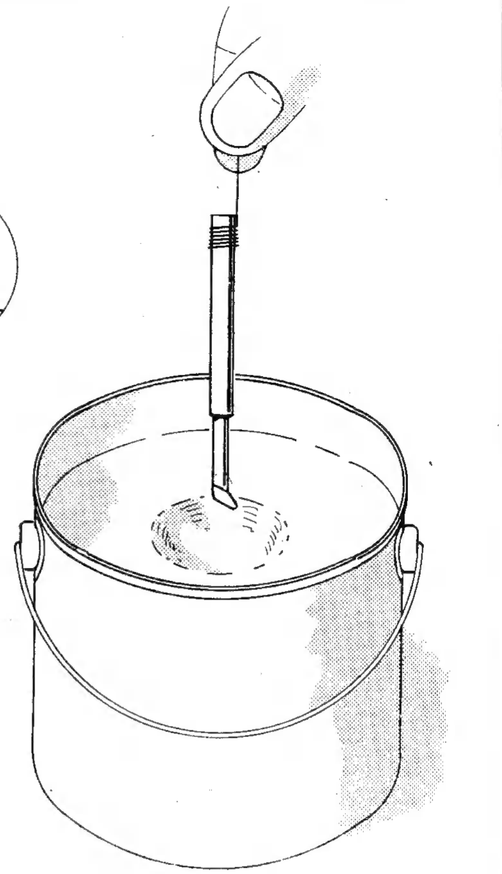


Fig. 5. Quenching the tool

head the full size of the rod.

This machining should be carried out with a tool having a slightly rounded point, so that a small radius is left on the work to strengthen the tip of the tool. The tool is then gripped in the vice for filing the end to the finished shape indicated in the drawing. Clearance must also be filed below the forward edge so that the tool can advance into the work without rubbing; this edge is also filed obliquely to enable the cutting edge to clear the centre of the work on reaching the bottom of a blind hole. To avoid rubbing and springing of the tool away from the work, it is most important to ensure that adequate clearance is given below the front cutting edge. This can usually be checked, as shown in Fig. 4, by entering the tip of the tool in a hole in the drill gauge, of a diameter corresponding to that of the bore to be machined.

Hardening and Tempering

After the tool has been finished to shape, it must first be hardened and tempered, before being finally sharpened. A convenient way of holding the tool for hardening is shown in Fig. 5; a length of iron wire is firmly secured to the shank and the tool is slowly and evenly heated to a cherry-red in the flame of a Bunsen burner; the tool is then quickly plunged vertically into a can of cold water. If the water is first stirred so as to form a vortex, the quenching will be more effective.

When tempering the tool, all except the cutting edges should be first cleaned bright with a strip of worn emery cloth; the end of the shank is then carefully heated and, as soon as a pale-straw colour reaches the tip, the tool is again quenched.

In this way, the shank is softened and able to withstand shock without breaking, but the cutting edges remain hard.

To finish the tool ready for use, the cutting edges are sharpened either on a fine abrasive wheel or with a small oilstone slip.

Larger Boring Tools

For machining bores of larger diameter, a tool can be made by raising the end of a length of $\frac{3}{16}$ in. diameter silver-steel rod to a bright-red heat and then forging the tip over to a right-angle, the cutting edges are then filed to shape as in the previous example. However, the rod cools rather quickly when gripped in the vice, and, if hammered when below a dull-red heat, cracks are liable to form in the material.

An alternative way of making these tools is shown in Fig. 6. A length of $\frac{1}{4}$ in. diameter silver-steel rod, or any larger size, is turned

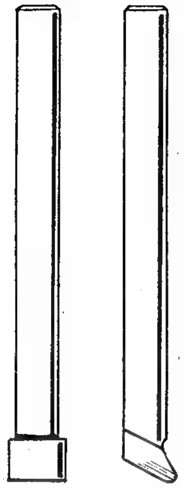


Fig. 6. *A method of making larger boring tools*

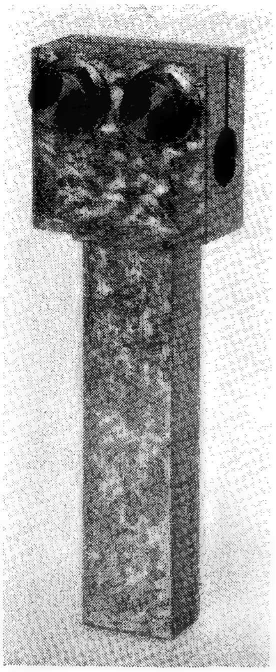


Fig. 7. *A holder with two clamp-screws for mounting larger tools*

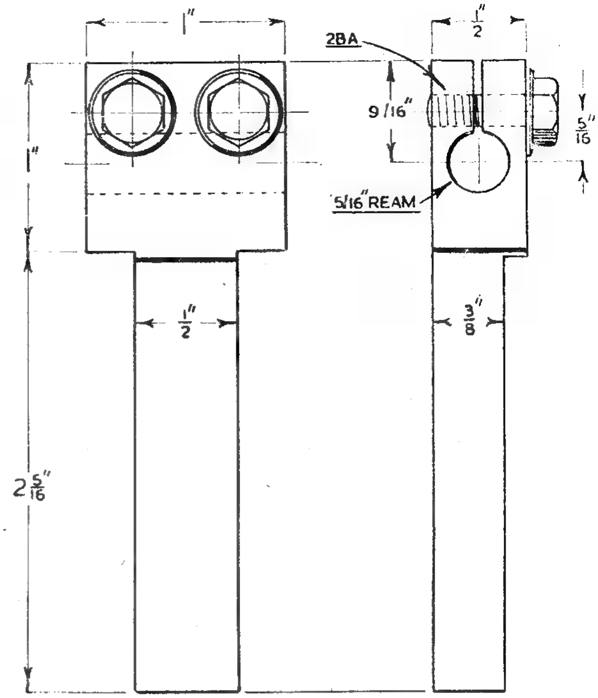


Fig. 8. *Details of the larger toolholder*

down to form the shank for gripping in the tool-holder, and the head of the tool, as in the previous instance, is shaped from the unmachined portion of the full diameter.

Still larger boring tools, suitable for heavier work, having shanks of ¼ in., or more, in diameter, should preferably be mounted in the type of holder illustrated in Fig. 7, where greater rigidity is obtained by providing two clamping-screws.

MODEL CARS AT THE "M.E." EXHIBITION

(*Continued from page* 363)

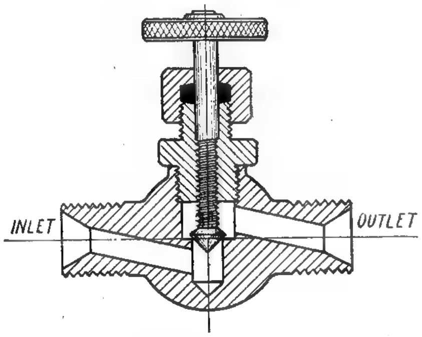
So far as the Competition Section of the exhibition was concerned, model cars were represented in the Mechanically-Propelled Road Vehicles class, chiefly by W. R. Finch's non-working model of that hardy old favourite, the 4½ litre "Blower" Bentley. This model attracted a good deal of attention, and was something of a "Curate's Egg," being good, even extremely good, in parts. Chassis detail, which included suspension, steering connections, sump, filters, fuel lines and the impressive supercharger gear were finely executed, and the wheels and radiator were first-class. Body finish and paintwork were not up to this standard, however, and the whole car rather missed the mark when viewed in profile, due to the exaggerated downward slope of body and bonnet. As a well-known motoring authority observed when inspecting it, the old Birkin car reminded one of a powerful express locomotive, with its straight line from scuttle to massive radiator-cap, and any alteration of this "perspective of power" spoilt the picture. Nevertheless, Mr. Finch is to be congratulated on an excellent attempt. C. E. Castle had also done a good job of work in the Junior section with his 1934 G.P. Bugatti, and one would have enjoyed a clearer view of the modest little Model T Ford which lurked coyly inside the scale model London Garage premises shown amongst the scenic models by S. E. Hamilton !

Which brings us to the default of the "self-propelled" racing models. Perhaps this is not the place to discuss the whys and wherefores, although I hope, with the Editor's permission, to say more on this theme at a future date. One fact, however, does call for comment. Amongst the clubs and societies, who represent the interests of their respective adherents, power boats, model aircraft, ship models, radio-controlled models and model engineering generally all had their place, with stands manned by enthusiasts eager to spread their gospel to the receptive visitor. The model car world also has its governing body, pledged to foster the building and racing of model cars. Yet one searched in vain for the headquarters of this movement, which, but for the good work done by the North London Society, would have remained unhonoured and unsung ! Doubtless there are cogent reasons why the national body did not take advantage of this excellent chance to gather new recruits. It would surely be all to the good, however, if next year the M.C.A. were to be present to tell its own story, and that it should not be left to a territorial club to show the flag, and to carry on the work of the old Pioneer Club, whose efforts at this exhibition in earlier years did so much for model car racing in its infancy. Any comments, you model motorists ?

L.B.S.C.'s Lobby Chat

ABOUT STOP-VALVES

IN a recent letter about some boiler fittings for a commercially-made locomotive which he is rebuilding to *Live Steam* specifications, a correspondent says that he has never noticed any reference to globe valves in these notes, and asks if there is any specific reason for this, as I seem to have dealt with angle-valves, and various other kinds. As I occasionally receive letters about boiler fittings, their troubles, and



Section of globe valve

suggested remedies, we might as well include a collective answer in a lobby chat, and smite all the birds with a single shot.

The only reason why I haven't dilated at length on the subject of globe-valves, is because my locomotive designs don't call for them, in the normal course of events. There is nothing whatever against their use, in places where a "straight" valve with fine regulation is required; and in full-size practice they are often to be found in the pipe lines, at what our military friends would call "strategic points." On the small engines, we can usually arrange our stop valves direct on the boiler, and angle valves are more suited to that form of attachment. There are, however, certain places where a globe valve could be used very well; for example, when the steam supply to an injector is taken from the turret, or an elbow on top of the boiler, high up under the cab roof. The steam pipe could be brought down the front of the backhead (says Pat) and a globe valve inserted at any point which might be handy and convenient to the other fittings.

How to Make a Globe-valve

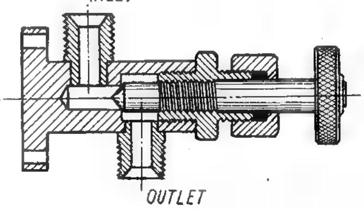
A globe-valve is just as easy to make as an angle-valve, and a section of a typical one is shown in the accompanying illustration. The working part of the valve is just the same as on any other type of screwdown-valve of the pin or conical pattern; simply a recess in the body, with a seating formed at the bottom of it, the plug carrying the valve-pin or spindle being screwed into the recess. Holes are drilled slantwise from the ends of the body, into the recess; one slopes upwards to the space above the valve, and the other slopes down to the space below the seating. The latter should be the inlet side, as this relieves the gland from continuous boiler pressure. The ends of the valve body may be made to any desired pattern, with internal or external threads, and countersunk for unions if needed.

The bodies of the globe-valves used on full-sized locomotives are made from castings, and it is a good wheeze to follow suit on the weeny editions, as a chucking-piece can be cast on, opposite that part of the body in which the valve seating is formed. Our approved advertisers can supply these little castings in several sizes, and in every case, the machining is the same; so if I briefly run through the construction of the valve shown in the sectional illustration, the same method can be followed for any other size.

Chuck in the three-jaw by the piece provided, and face the boss on the body. Centre, and drill nearly through with No. 24 drill. Open out and bottom to half the depth of the body, with 9/32 in. drill and D-bit; tap $\frac{5}{16}$ in. × 32 or 40. Run a 5/32-in. parallel reamer into the blind hole as far as it will go. Rechuck by one end; face the other end, centre deeply, and turn the outside to $\frac{3}{8}$ in. diameter for $\frac{1}{4}$ in. length. Screw it $\frac{3}{8}$ in. × 32. Reverse and rechuck in a tapped bush, to ensure the other end running truly, and repeat operation. Be careful over the next bit, which is to drill a No. 30 hole from one end, into the recess above the D-bitted seating, and a similar hole from the other end, into the hole below the seating. The notes I gave on drilling passageways in cylinders, from bore to port, can be followed with advantage here, taking care that the hole slanting upwards, doesn't come out close enough to the valve seating, to cut into it.

To make the gland fitting, chuck a piece of $\frac{7}{16}$ in. hexagon rod in the three-jaw. Face, centre, and drill down with No. 30 drill, to a depth of $\frac{5}{8}$ in. full. Open out with No. 21 drill to $\frac{1}{8}$ in. depth. Turn down $\frac{3}{16}$ in. of the outside to $\frac{1}{4}$ in. diameter, and screw $\frac{1}{4}$ in. × 40. Part off at $\frac{1}{2}$ in. from the end. Reverse and rechuck in a tapped bush, to make certain that the hole runs truly. Turn down $\frac{3}{16}$ in. of the outside to $\frac{5}{16}$ in. diameter, and screw $\frac{5}{16}$ in. × 32 or 40 to suit body. Tap the hole 5/32 in. × 40, or 3 B.A.; if quick action is needed, use the coarser thread. Make a $\frac{1}{4}$ in. × 40 gland nut, from $\frac{3}{8}$-in. hexagon rod; this is just the same as a union nut.

The valve spindle can be made from 5/32-in. rustless steel or phosphor-bronze rod; if the former, make quite sure that it *is* rustless, as I've received samples of so-called "rustless" steel from readers, which had both rusted and pitted. I have also seen cycle balls which had been sold as "rustless." A rough-and-ready test is to try a magnet on



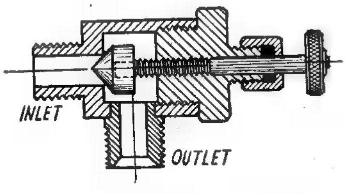
Section of flanged valve

the steel; a child's toy magnet will do quite well. If the steel flies to the magnet like sweethearts after a long separation, don't use it; rustless steel is non-magnetic—anyway, the stuff I use myself, treats a magnet with contempt! For the valve illustrated, a piece $1\frac{1}{8}$ in. long is required; file a square on one end, using the chuck jaw as a guide. Reverse in chuck, and screw 5/32 in. or 3 B.A. to match the tapped hole

in the gland fitting, for about ½ in. length. Face the end, centre, and drill No. 43 for about $\frac{3}{16}$ in. depth; fit a handwheel, any size you fancy, on the squared end. The wheel can be turned from brass, dural, rustless steel, or anything else available; a fibre one could be used for operation by tender fingers. There is also the age-old "cool handle"; for this, just turn a half-round groove in the rim of a metal wheel, wind up a small spiral spring, from steel wire, to a size which will just fit the groove, bend it into a circle, spring it into the groove, and secure with a touch of solder.

Just Like the Kitchen Tap!

Screw the spindle through the gland fitting, and in the end of it, fit a conical valve with a stem turned to a tight push fit in the hole in the spindle, like the jumper on the kitchen tap; only this one won't be needing new washers every five minutes or so! To make the valve, chuck a bit of 7/32-in. or ¼-in. round bronze or rustless steel rod in the three-jaw, face the end, and turn down a bare $\frac{3}{16}$ in. length to fit tightly in the hole in the spindle. Part off at $\frac{5}{16}$ in. from the end. Reverse in chuck, grip by spigot, and turn the outer end to a cone point about 45 deg. angle, skimming the outer edge down to a wee bit under 7/32 in. diameter. Push the spigot into the hole in the spindle, and assemble the valve as shown in the illustration, packing the gland with a strand of graphited yarn, and putting a smear of plumbers' pipe jointing on the threads of the gland fitting. Don't get any in the recess! The valve can be seated steamtight, merely by screwing it down tightly



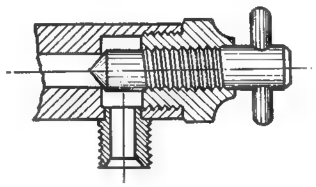
Large valve with small spindle

when first assembling; afterwards, it will be quite O.K. with quite a moderate pressure of the screw.

The size of valve given above, is quite all right for most purposes on 3½ in. and 5 in. gauge engines; it can be enlarged within reason, or reduced to almost microscopic dimensions, the method of construction remaining the same. Just to pull somebody's leg, I made one only, $\frac{3}{16}$ in. overall length; valve and spindle were in one piece, made from a domestic pin, the head being turned to form the valve. It was threaded full length by aid of a watchmaker's screwplate, and the hole in the gland-fitting tapped full length. The handwheel was screwed on to the end of the spindle, and a touch of solder prevented its coming unstuck. The tiny thing worked! I told the "donee" to get it silver-plated, and use it for a watch-chain charm.

Flanged Valve

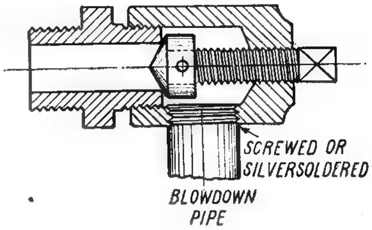
This is a first cousin to the globe-valve, and can be used with advantage in places where the inlet and outlet don't of necessity have to be in line, and where a support is handy (such as the boiler backhead) to which the flange can be attached. Several of my own engines have valves of this kind on the backhead, taking steam from the turret, or an



Quick-acting water gauge blowdown valve

elbow, on top of the wrapper. As the steam inlet isn't in direct communication with the boiler, there is no need to fit the valve high up, level with the steam space; it can be placed in any available spot between the rest of the fittings. The outlet union can be at right-angles, or indeed at any angle, to the inlet; on my L.M.S. Pacific, for example, the valve is situated half way down the backhead, by the firehole door. Steam enters the top union via a pipe from the turret, and the outlet is at the side, the pipe going direct to a donkey-pump on the right-hand side of the firebox. Another instance is the blower-valve on *Britannia*.

The whole issue can be made from rod material, preferably bronze or gunmetal, though brass will do at a pinch; the union screws are silver-soldered into the body. Dimensions can be arranged to suit the job in hand. By way of variety, I have shown a one-piece valve and spindle; but if desired, the valve and spindle can be made in the same way as described and illustrated for the globe-valve. If a coarse-threaded spindle is used, a full opening can be easily obtained with only one turn of the handwheel; this is mighty handy for injector steam valves which are operated when the engine is running.



Quick-acting boiler blowdown valve with large waterway

Large Valve with Small Spindle

It sometimes happens that a valve is needed with a big steam or waterway through it; and if made normally, with a proportionate-sized spindle and handwheel, it would look unsightly among the other backhead adornments, probably project too far, or else be awkward to fit in, and difficult to operate. In that case, a valve such as is illustrated here, could be used. It has a big steam passage, and a separate cone valve to match; but instead of the valve having a spigot to fit a hole drilled in the spindle, à la the kitchen tap, the arrangement is reversed, the valve being drilled to receive the end of a small spindle passing through the gland fitting. This is furnished with a small handwheel and gland nut to match. The relative sizes can be anything within reason. The same arrangement of valve and spindle could be used with either of the valves described above. There is no need to detail out the construction, as this is practically the same as the other valves described in these notes; and anyway, the drawing is self-explanatory.

Water-gauge Blowdown

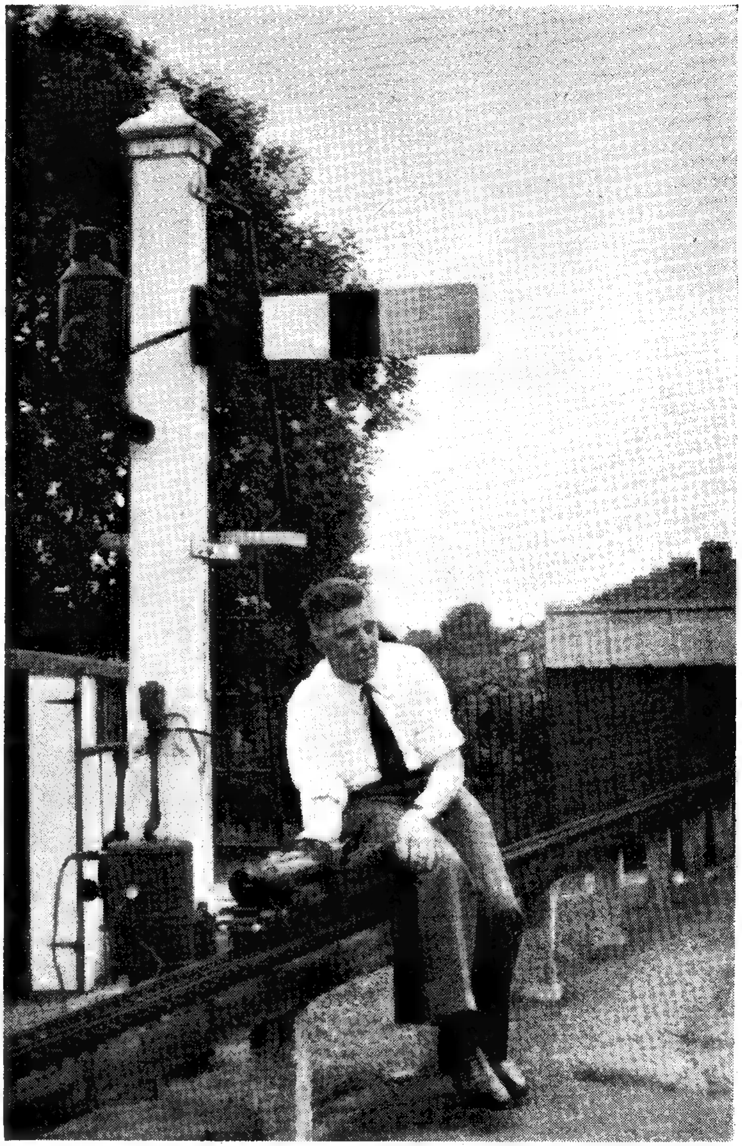
Complaints occasionally come in, that with my "standard" type of water-gauge, when used in districts where the water is hard or "dirty," there is difficulty in keeping the blowdown valve steam and water-tight, and at the same time easy to operate. Little bits of scale and grit not only get stuck in the valve seating, causing a leak or blow, but they get jammed around the end of the valve-pin, and also get into the threads, making the spindle very

stiff to turn. A good remedy for that is to make the blowdown valve as shown in the accompanying drawing. Instead of the bottom fitting being drilled and tapped direct for the valve spindle, it is opened out in a similar way to the valves described above, and a plug made to fit. This plug is drilled and tapped to take the valve spindle, which is screwed through it as shown. This arrangement ensures quite a big recess around the valve seating and pin; and if the blowdown pipe is made a bit larger than usual, any scale or grit coming through the valve, will be blown clean away, instead of choking the waterway, damaging valve and seating, and getting into the threads.

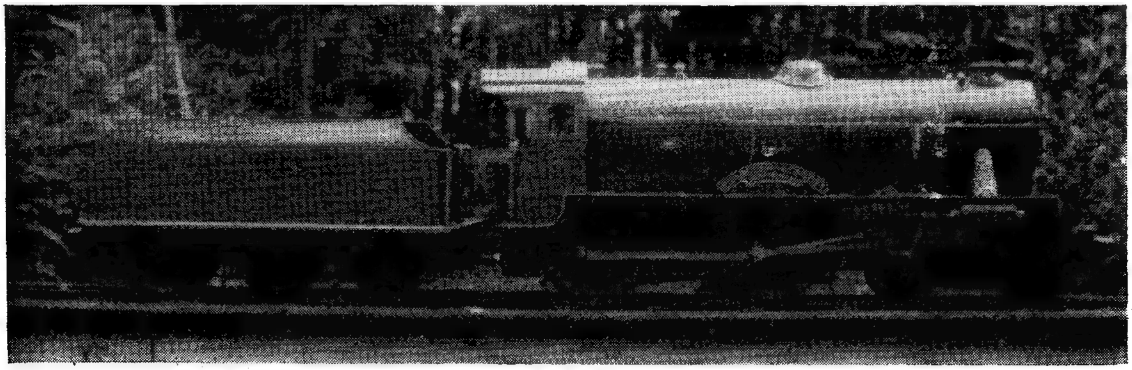
Boiler Blowdown Valve

The trouble mentioned above, sometimes occurs with the screw-down type of boiler blowdown valve, especially if the boiler is allowed to run for too long a period without washing out. Dirt and scale which settles on the foundation ring, invariably finds its way to the outlet, so it is advisable to take precautions; and it can easily be seen, that any valve with the outlet opening in the ring itself, would be rendered useless before you could say—(deleted by censor)—anyway, you'd probably say it afterwards, probably adding an encore !

The sectional illustration shows a boiler blowdown valve which, while not as effective as the "Everlasting" type (which is absolutely the cat's whiskers) is a pretty good cousin to it. The valve body is merely a double-ended nipple with a big hole through it, the size depending on the boiler, into which one end is screwed. A long nut,



(Right)—The old L.B. & S.C.R. signal protects Mr. Knight and "Helen Shorter"



(Below)—"Wilwau" castings—used and approved BY WILWAU

like [redacted] glorified union nut, goes over the outer end, and carries a valve made as shown; the spindle is screwed full length, the outer end being squared for key or box-spanner operation. The hole in the end of the nut is tapped to suit the spindle. A coned valve is fitted to the inner end of the spindle, which is screwed into it and pinned. The blowdown pipe, which should be the largest size that the nut will accommodate, can either be screwed in [redacted] shown, or silver-soldered. Two or three threads will give plenty of hold for the pipe, as there is no pressure to withstand; the end of the pipe is left open. Any leakage at the screw, doesn't matter [redacted] Continental. Well, I guess the above dissertation clears up recent queries raised about valves; but if there should be any more, just shoot them along—don't be shy !

"Helen Shorter" Comes South

One fine afternoon last July, Messrs. Cashmore, Brookes and Knight, of the North London club, paid [redacted] visit to my little railway, by invitation, to try out the 4-8-0 *Helen Shorter*, which started life many years ago as a 4-8-4 tank engine built to *Helen Long* specifications. I mentioned some time ago, in these notes, that Mr. Cashmore had rebuilt her into a tender engine, shortening the frames and dispensing with the trailing bogie, hence her new name. She is all right for speed and power in her new guise, but alas ! these things invariably happen when they are least expected and unwelcome—one of the oil feeds failed, leaving the cylinder very dry. Yet even with this disability, she didn't do badly; and with the oil feed 100 per cent. perfect, she should be a real humdinger. However, we made up for *Helen's* short(er)comings, by running one of my own locomotives, the old L.N.W.R. tank engine *Olga*; and that lady's performance made amends. The three brothers mentioned, were tickled to death at the way the old 4-4-2 steamed and pulled with hardly any fire, blowing off when running with the injector working. *Olga* relies entirely on her injector for water supply, having no pump.

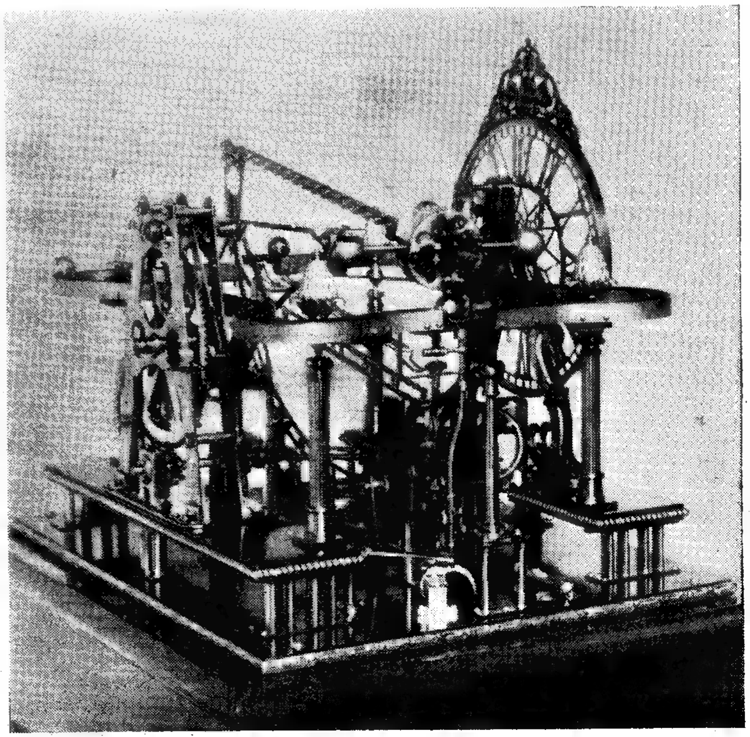
In passing, the photograph which shows friend Knight driving *Helen*, also shows the "works" of the old L.B. & S.C.R. signal; the air tank, and the magnetic valve above it, which regulates the supply of air to the operating cylinder (which started life [redacted] foot-operated tyre pump) [redacted] be plainly seen. The whole outfit still works perfectly.

Reverting to the failure of the oil supply, a new reader recently wrote me that he had made [redacted] great improvement on my "standard" type of lubricator, by fitting one with a fixed barrel, instead of the oscillating cylinder. The plunger was operated by a slide crank, and only one valve (delivery) was needed, as the oil entered the pump barrel through a slot at the upper end of the stroke. Boy, *did* your humble servant chuckle ! Bless his innocent heart, I tried and immediately discarded that kind of outfit when I first started experimenting with mechanical lubricators; and that was umpteen years ago. The reason was—and if our friend hasn't found it out by now, he jolly soon will—that any slight leakage of steam past the single valve, blows back into the oil tank as soon as the plunger uncovers the inlet slot. The steam condenses, and the resulting condensate water "tips all the oil overboard," filling the tank with water. Even if the pump should start operations, there is no oil for it to feed into the cylinders. The type I specify, with an oscillating cylinder, gives [redacted] positive feed under any conditions; and provided that the sliding faces are O.K. and the port in the cylinder doesn't bridge those in the pump stand, the pump will feed against any clack leakage, even operating with no valves at all !

A UNIQUE CLOCK

Does anyone know the present whereabouts of this ingenious piece of mechanism ?

IN the issue of the "M.E." dated March 25th, 1926, a description appeared of a very elaborate and ingenious clock, the motive power of which was a mystery. It has now been lost, and we have been asked by the designer to assist him in tracing it. Apparently, during his absence in South Africa in 1950, the clock was sold in error to Mr. F. Kilroy, a general dealer, whose present address is unknown. As the clock is absolutely the only one of its kind in existence, we shall be greatly obliged if anyone who can give any information concerning it, or furnish Mr. Kilroy's address, will communicate with the Editor.



THE ALLCHIN "M.E." TRACTION ENGINE to $1\frac{1}{2}$ in. Scale

By W. J. Hughes

ONE small job remains to be done on the compensating centre, or rather on the main spur-wheel. We drilled six No. 30 holes in the flange of the centre, which are to take the screws which secure the two components together. The wheel has been pressed on to the centre, and the holes should now be " spotted " through to the wheel, with a No. 30 drill—just a small indentation, of course.

Then change the drill for a No. 40, and drill the holes right through the wheel. Tap 5 B.A. or $\frac{1}{8}$ in., and countersink the holes on the flange side. You *can* use ordinary countersunk steel screws, but I would advise those of the " socket-head " (Allen) variety. These are more expensive, but they are high-tensile steel, which will stand the racket better. Strictly speaking, if the force-fit of these two components is what it should be, the use of the screws is probably unnecessary ; but when we remember that this unit has to transmit all the power of the engine, which is itself multiplied considerably by the gearing, it seems a wise precaution to use the screws to key the two together.

Continued from page 236, *August* 20, 1953.

Completing the Bevel Wheels

The same remarks apply to the screws which secure the bevel-wheels to their bosses. We have already remarked (July 16th issue) that the left-hand bevel has four No. 31 holes, countersunk inside, and the right-hand one has six No. 31 holes countersunk outside.

These should be "spotted through" to the flanges of the centres with a No. 31 drill, and then drilled for tapping with a No. 43. The " left-hand " ones are $\frac{3}{8}$ in. deep ; those in the right-hand centre go right through. Tap the holes 6 B.A., and again the use of countersunk Allen screws is advisable. (If these are unobtainable locally—as is possible—Reeves can supply.)

Take care, by the way, that the screws in the left-hand wheel are arranged to miss the driving-pin bosses in the centre. The four holes through the latter can be drilled $\frac{1}{4}$ in. diameter, using the jig made for the locking-pin holes in the compensating-centre, and are then opened out to 17/64 in. diameter.

Bevel Pins

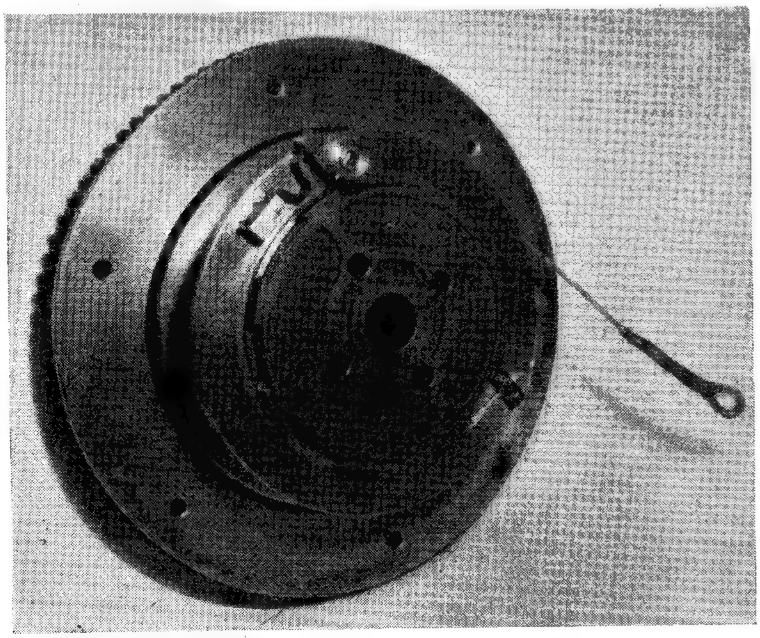
The three bevel-pins are a simple job, and mine are made from $\frac{1}{4}$ in. diameter silver-steel, hardened right out and tempered slightly. However, they could be made from mild-steel, and case-hardened.

Grip a length of rod in the three-jaw chuck, and face the end. Remove from the chuck, and drill the cross oil-hole 3/32 in. diameter at a distance of $\frac{7}{16}$ in. from the end. Replace in the lathe, centre the end, and drill the axial oil-way, also 3/32 in. diameter, to meet the first. Part off at $\frac{13}{16}$ in. long, and slightly dome the other end. Remove any " fash" from the holes.

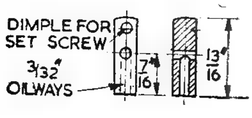
Press the pin into one of the radial holes in the compensating-centre, so that the domed end comes slightly below the surface of the winding-drum boss, and poke a No. 43 drill through the 6-B.A. hole tapped for the set-screw which will secure the pin in place, to form a " dimple " in the pin.

Remove the pin, which can be done by pushing it right through into the bore, and then make two more of the same. Harden the pins, if silver-steel, by raising them to red heat and quenching in tepid water. Then temper to " light straw," as in tool-making. If mild-steel, case-harden in the usual manner. Here again Allen grub-screws are best to use, to secure the pins in final assembly.

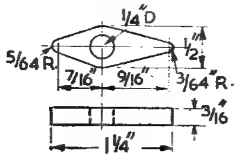
To machine the winding-drum, grip the casting in the outside jaws of the three-jaw, and use slow back-gear. Rough-turn the outside face and edge of the casting, taking a good cut so as to get well under the



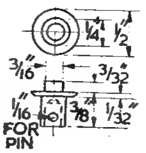
Photograph No. 43. Main drive and winding drum assembly—pawl in driving position. Cheese-head screws to be replaced with hexagon head on spring-block and clamp



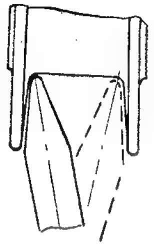
Pins for bevel-pinions



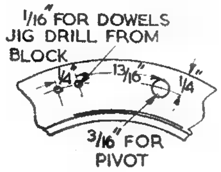
Winding-drum pawl



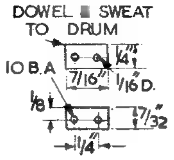
Pivot for pawl



Finishing the sides of the rope-groove



Spacing for spring-block and pivot



Block for spring

skin ; and then with a good hefty boring-tool take a roughing-cut through the bore. Hone up the boring-tool (or regrind if necessary) set the inside calipers to a gnat's whisker less than 3 in., and bore out to this dimension, which should be slightly smaller than the winding-drum boss of the compensating-centre, of course.

Now go carefully, taking very light cuts until the boss will just enter and rotate in the bore, without shake. You can then machine the $\frac{1}{32}$ in. deep relief $\frac{5}{8}$ in. wide on the inside of the bore, as shown in the drawing (June 11th issue). Its distance from the outer face should be slightly more than $\frac{1}{8}$ in., so that when the latter is finish-turned, the distance becomes $\frac{1}{8}$ in. exactly.

Finish-turning of the face should be done with a keen tool, of course, and note that on this face (which will actually become the *inner* face when the drum is in position) the diameter of the spigot is $3\frac{1}{4}$ in. Turn the outer edge to $4\frac{1}{4}$ in. diameter, and round off the outer corner.

Finishing the Drum

Remove from the chuck, and change the jaws. Reverse the work and grip it with the bore on the outside steps of the inside jaws, if you follow my meaning. If your chuck is reasonably accurate, this should be near enough, for the winding-rope groove need not be *dead* true, but if the " wobble " is too pronounced, either pack a jaw or jaws, or use the four-jaw chuck, setting the bore to run true.

Rough-turn the outer face, and then the rope-groove, the slightly bevelled sides of which may be " stepped " at this stage.

In finish-turning, first use a stout parting-tool to machine the bottom of the groove. To finish the sides, use a round-nosed tool of about $\frac{1}{16}$ in. radius, which will give the correct shape to the corners at the bottom of the groove, and set it at an appropriate angle for one side, as sketched. By careful manipulation of the cross-slide and top-slide handles, the side may then be machined, with the curve running out into the flat part at the bottom.

If the tool is now placed as indicated by the dotted lines, the other side may be machined, again running out the curve into the bottom.

Face up the outside of the casting, the spigot now being $3\frac{1}{2}$ in. diameter, and turn the flange to $4\frac{1}{4}$ in. diameter. Round off the edges of the flanges, as drawn.

Driving-Pawl or Latch

The arrangement for driving the winding-drum was described in an earlier instalment (May 14th), and shown in a drawing published on June 11th. Now here are the drawings of the details.

For the latch or pawl, take a piece of $\frac{1}{2}$ in. × $\frac{3}{16}$ in. mild-steel—bright for preference—and set out the centre for the $\frac{1}{4}$ in. hole just over $\frac{1}{2}$ in. from the end, and on the centre-line. Mark out the shape as drawn—it will help to smear the surface with marking-blue first—and centre-dot the outline.

Drill the $\frac{1}{4}$ in. hole, saw the piece off the bar, and saw off the corners nearly to the lines. Finish to the lines, keeping the edges square, and then draw-file them.

Pivot for Latch

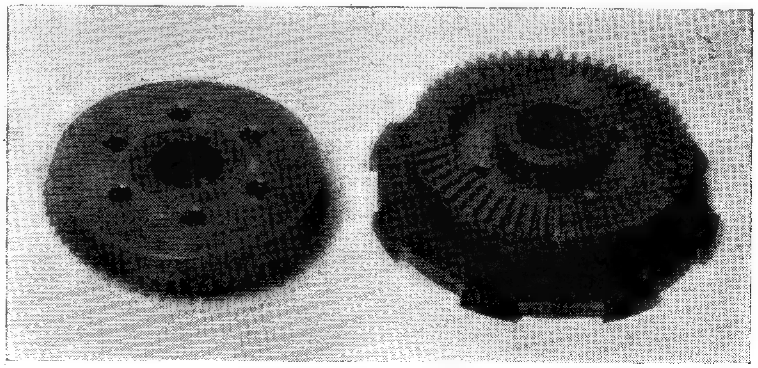
For the pivot, grip a stub of $\frac{1}{2}$ in. mild-steel in the three-jaw, with about $\frac{3}{4}$ in. protruding, and face and centre the end. Drill with a 5/32 in. drill to a depth of $\frac{5}{16}$ in.

Turn down to $\frac{1}{4}$ in. diameter (to fit the hole in the latch), for a length of $\frac{3}{8}$ in., and slightly round the corner of the $\frac{1}{2}$ in. diameter. Part off at about $\frac{9}{16}$ in. long.

Now before finishing the pivot, take the winding-drum and set out on the outer flange the positions for the block and pivot, given herewith. Drill the $\frac{3}{16}$ in. hole, and *one* only of the $\frac{1}{16}$ in. holes.

Grip the pivot in the three-jaw by means of the $\frac{1}{4}$ in. spigot, and turn down the end to a few thous. more than $\frac{3}{16}$ in., to leave the $\frac{1}{2}$ in. diameter flange 1/32 in. thick. Then carefully turn the end $\frac{1}{16}$ in. of this spigot to be a tight fit in the $\frac{3}{16}$ in. hole in the drum-flange. Withdraw the tool half a thou., measured by the mitre collar, and turn the rest of the spigot back to the flange, which should make it a press fit in its hole.

Turn off the end to leave the spigot 3/32 in. long, and give the end a slight " lead " with a very fine file, to help when pressing it into place.



Photograph No. 44. Bevel wheels secured to centres with countersunk Allen screws. Driving-pin holes not drilled in driving-boss

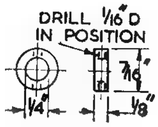
Spring and Spring-Block

I made my spring from a piece of old clock-spring, from a superannuated alarm-clock in the scrap-box. This was annealed by heating to red in a bunsen-flame, and allowing to cool slowly. It was $\frac{1}{4}$ in. wide, so the surplus was sheared off and the edge filed to leave a width of $\frac{3}{16}$ in. Two holes were then drilled No. 50 to clear the 10-B.A. screws used to fix the spring to its block.

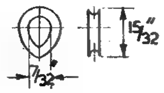
The block is made from $\frac{1}{4}$ in. square section mild-steel, filed down to 7/32 in. thick. Set out the positions of the screw-holes and the dowel-holes, and drill the latter $\frac{1}{16}$ in. diameter. The dowels are cut from 16-gauge wire, or silver-steel.

Place the block in position on the flange of the drum, with one of the dowels pressed through the block and into the hole in the flange. Secure the block with a small clamp and use the other hole in it to jig-drill the second hole in the flange.

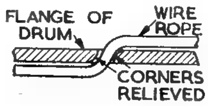
Remove the block, and anoint its face with solder-paint. Likewise anoint the dowels and the face of the flange, and heat with a bunsen or similar flame until the solder melts and tins the surfaces. Wipe with a rag damped with meths., to remove the flux, and then apply a further trace of the paint to all the surfaces. Incidentally, if the spigot of the pivot is *not* a press fit in its hole, this should be tinned with the other bits.



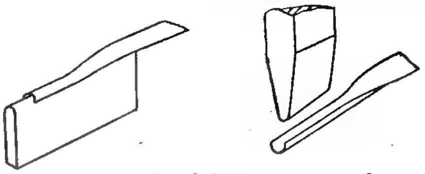
Retaining collar



Thimble for wire-rope



How to avoid abrading rope



Two methods of forming groove for thimble

Assembly

Assemble the pieces and warm up again until the solder melts and sweats them together. Clean up with meths., and remove any surplus solder by scraping. File the ends of the dowels flush. Drill (No. 55) and tap the two 10-B.A. holes in the block—they can go right through the dowels.

Press the pivot into its hole, if not already sweated in—I used a large toolmaker's clamp for this, with scraps of copper interposed to avoid damaging the work. Place the drum on its boss, and put the driving boss in place, and the pawl on its pivot. The spring may be bent to the shape given in the blueprint, although it will be found next to impossible to make the tiny scroll shown on the end, which may be just turned up as seen in the photographs. Bending is not too difficult with the use of round-nosed pliers, but with the spring screwed in place, some adjustment of the bends will probably be necessary in order to get the pawl to take up correctly the " **drive** " and "free" positions. Incidentally, I have not found it necessary to re-harden and temper my spring : there's still plenty of " bounce " left in it.

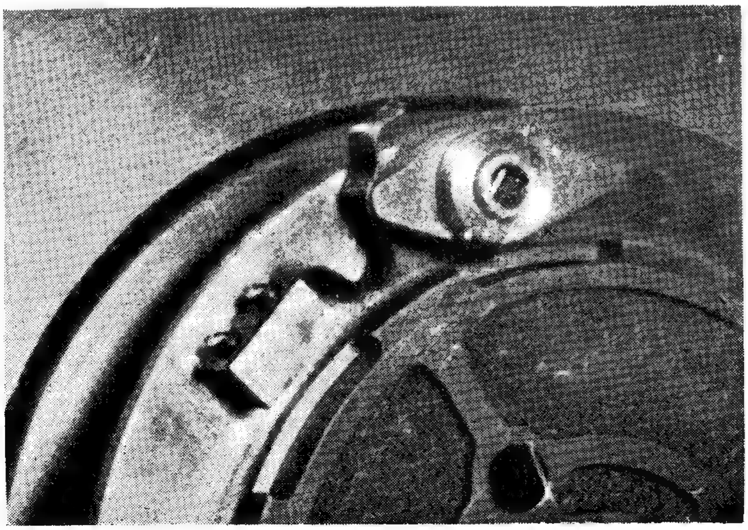
Collar, and Rope-Clamp

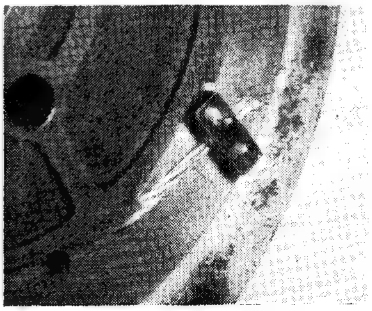
To make the retaining-collar for the pawl, grip a stub of $\frac{1}{2}$ in. steel rod in the chuck, and face and centre the end. Drill $\frac{1}{4}$ in. to a depth of $\frac{1}{4}$ in., and reduce the end $\frac{1}{4}$ in. or so to a diameter of $\frac{7}{16}$ in. Part off to $\frac{1}{8}$ in. long.

Place the block in position on the a scrap of thin paper between collar and pawl, to give clearance, and drill the cross-hole for the pin right through. This should be No. 55, opened out to $\frac{1}{16}$ in., so as to be a tight fit for the 16-gauge pin—$\frac{1}{16}$ in. silver-steel will do. Personally, I have used a $\frac{1}{16}$ in. $\times$ $\frac{1}{2}$ in. taper-pin, which meant drilling No. 55 and reaming out with a taper-reamer. The paper is torn away after fitting the pin.

The rope-clamp, shown on the drawing in the June 11th issue, is simply a $\frac{7}{16}$ in. length of $\frac{3}{16}$ in. $\times$ 3/32 in. mild-steel, with two No. 50 holes to take the 10-B.A. screws which secure it to the drum. The clamp can be cut from a scrap of 13-gauge or 12-gauge plate, and a small groove about 3/64 in. deep is filed across the under-side to take the rope.

(*Continued on page* 376)





Left—Photograph No. 45. Winding-drum pawl in paying-out or free position; and Right—Photograph No. 46. Clamp to secure inner end of wire-rope

Model Power Boat News

BY MERIDIAN

HISPANO-SUIZA AND FORD TROPHY RACES AT ST. ALBANS

THE one disappointing feature about the races for the Hispano-Suiza and Ford Trophies was the lack of Continental opposition. M. Suzor had unfortunately not recovered sufficiently from his accident to be well enough to attend and the Swiss enthusiasts too, were unable to come. At the time of writing however, it is hoped that a strong British team will be visiting Paris for the International event in September, so that there is a good chance of a true "international" at this regatta.

Apart from the above-mentioned disappointment, however, the regatta was indeed a success. Glorious weather for both days, combined with smooth water, made conditions for racing boats really ideal, and the excellent organisation of the St. Albans clubs—especially with regard to the enclosure arrangements, all helped to make the event a really enjoyable occasion.

The regatta was a two-day affair, and the Hispano-Suiza Trophy for 10 c.c. boats was run off on the Saturday. A most interesting race, with some high speeds, resulted in the holder W. Everett (Victoria) retaining the Trophy at a speed of 67.28 m.p.h.

Second was K. Hyder (St. Albans), with *Slipper* 4, at 66.41 m.p.h., and a strong challenge by G. Stone (Kingsmere), whose boating activities have been much reduced this year, resulted in a third place at 63.92 m.p.h. with *Lady Cynthia.*

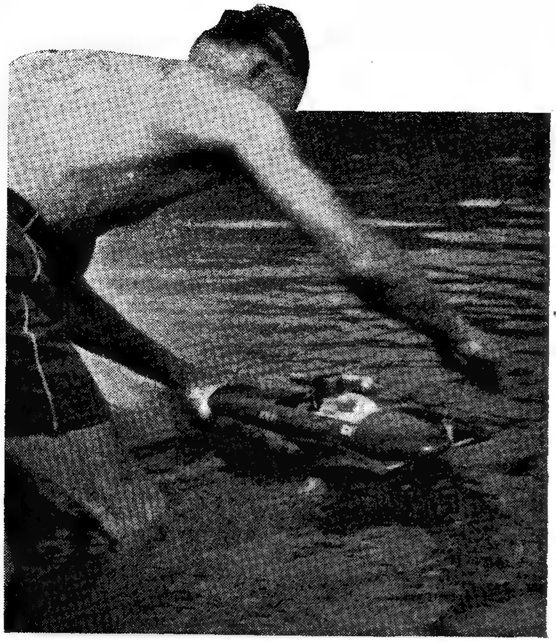
Every commendation must go to the owners of the home-built jobs, Messrs. R. Phillips and B. Miles, both of whose entries finished well up the list, but it is fairly evident that home constructors of 10 c.c. engines have a heavy task in trying to produce a really "hot" engine in this size. It appears that these small engines are very critical in design and to develop full power must rev. at around 16,000 r.p.m. under load. Mr. R. Phillips' *Foz* 2 has a new engine installed, but at the moment it does not seem as powerful as the previous one, which was used when setting up a Class "C" record.

There were few capsizes or aerobatics during the course of the racing, and three runs per boat were allowed, so that they were seen to full advantage.

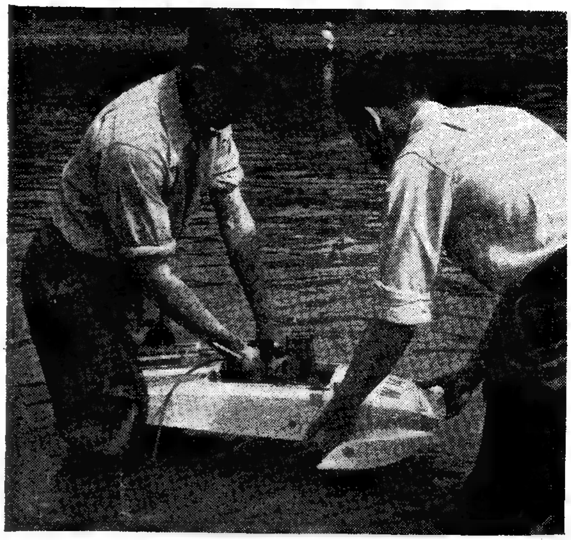
Here is a short table, showing the best speeds :

K. Hyder (St. Albans) made consistently good time on all runs

An interesting four-stroke engined "B" class boat by Mr. Churcher (Coventry)



George Stone starting "Lady Cynthia" ("C" class restricted) which won places in both events



Fastest boat in "A" class was W. Brightwell's "W 14" (Wicksteed)

HISPANO-SUIZA RACE—500 yd.

W. Everett	Victoria	*Nan* (CR)	67.28 m.p.h.
K. Hyder	St. Albans	*Slipper 4* (CR)	66.41 "
G. Stone	Kingsmere	*Lady Cynthia* (CR)	63.92 "
W. Everett	Victoria	*Nan 2* (CR)	63.13 "
B. Miles	Kingsmere	*Dragonfly 3* (C)	59.46 "
R. Phillips	S. London	*Foz 2* (C)	58.11 "
S. Poyser	Victoria	*Rumpus 7* (CR)	56.19 "

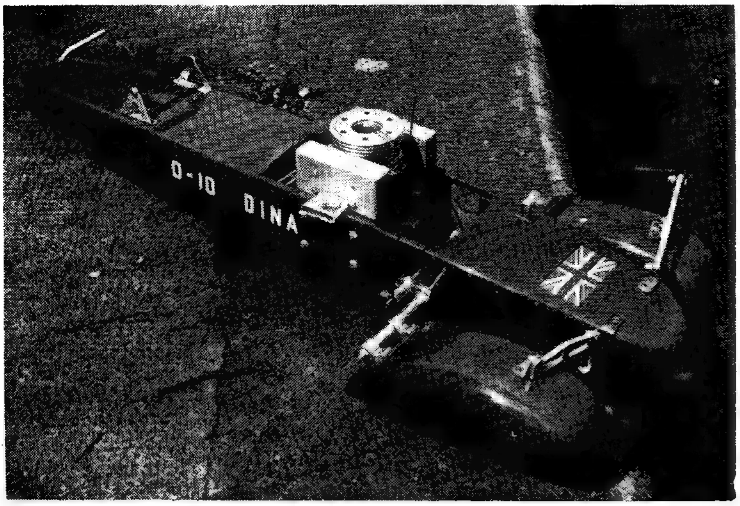
The Ford Trophy Race is open to all classes, so there was a much larger entry on the next day, when the 15 and 30 c.c. entries were added to the boats that had already run in the Hispano-Suiza race. For this reason, only the normal two runs were allowed, but this was quite sufficient for most of the entries to show their paces.

The order of running was arranged so that the smaller boats went on the line first, and when all of these had completed one run, the line was changed for the 15 c.c. types and so on. By this method, plenty of time was available should repairs be necessary and the two lots of line changing took but little extra time.

Speeds of well over 60 m.p.h. were recorded by several boats, and at the end of the first complete round, the leading positions were as follows :—(1) G. Stone (Kingsmere) *Lady Cynthia*, 65.99 m.p.h. ; (2) W. Brightwell (Wicksteed) *W14*, 65.65 m.p.h. ; (3) W. Everett (Victoria) *Nan*, 65.56 m.p.h. ; (4) K. Hyder (St. Albans) *Slipper* 4, 63.92 m.p.h. ;

J. Bamford (Aldershot) complete with pirate headgear, starting his flash steamer "Hero" ("A" class)

A fearsome aquatic monster, the "A" class "Eega Beeva," by B. J. Pilliner (Southampton)



A promising " A " class boat, " Dina," by J. Ward (Orpington)

(5) J. Benson (Blackheath) *Orthon*, 62.71 m.p.h.

Several other boats had recorded very good runs at well over 50 m.p.h., and the second runs were anticipated with much interest. Few of the competitors, however, succeeded in improving on these speeds. The exception was W. Everett, with *Nan*, who achieved 66.85 m.p.h. on the second attempt, and thus brought off the " double " for the second year in succession.

There were many interesting craft taking part in the racing, but special mention should be made of the two flash steamers that were entered. One of these was B. J. Pilliner's *Eega Beeva*, which had appeared in one or two previous regattas this year, and the other was also a Class " A " entry by J. Bamford (Aldershot). This boat (appropriately named *Hero*) provided much entertainment and interest while it was on the line. The valve gear of this engine is piston-operated, and a starting cord is necessary to ensure that the engine runs the right way round ! The boat also has the habit of gracefully sinking at the conclusion of each run—always before it could be reached. When the boat was running, it gave the impression that it is capable of development. Mr. Bamford has already achieved runs of over 40 m.p.h. with this boat which is certainly a stout effort.

In addition to prizes for the first four places, there were some extra ones for competitors in the various classes who were not placed. In the case of the Class " C " prize, a dead heat between Messrs. Phillips and Miles had to be re-run, and the former competitor emerged the winner.

At the present time, the Class "B" boats are in the doldrums, and the fastest 15 c.c. boat was G. Lines' *Sparky* 3, which is still in course of development. Several well-known exponents were absent, and this explains, to a large extent, the rather poor representation of Class " B " hydroplanes.

The table above shows speeds and winners of the various prizes.

FORD TROPHY RACE—500yd.

1. W. Everett	Victoria	*Nan* (CR)	66.85 m.p.h.	
2. G. Stone	Kingsmere	*Lady Cynthia* (CR)	65.99 ,,	
3. W. Brightwell	Wicksteed	*W 14* (A)	65.65 ,,	
4. K. Hyder	St. Albans	*Slipper* 4 (CR)	63.92 ,,	
J. Benson	Blackheath	*Orthon* (A)	62.71 ,,	"A" prize
W. Everett	Victoria	*Nan* 2 (CR)	62.36 ,,	
R. Phillips	S. London	*Foz* 2 (C)	58.11 ,,	"C" prize
B. Miles	S. London	*Dragon Fly* 3 (C)	58.11 ,,	
S. Clifford	Victoria	*Blue Streak* (A)	56.82 ,,	
G. Lines	Orpington	*Big Sparky* (A)	56.51 ,,	
J. Ward	Orpington	*Dina* (A)	55.88 ,,	
S. Poyser	Victoria	*Rumpus* 7 (CR)	53.27 ,,	"CR" prize
N. Fort	Victoria	(A)	52.99 ,,	
G. Lines	Orpington	*Sparky*3 (B)	49.41 ,,	"B" prize

THE ALLCHIN "M.E." TRACTION ENGINE

(*Continued from page* 373)

Two corresponding holes are jig-drilled (No. 55) and tapped 10 B.A. in the drum-flange, and a 3/32 in. hole drilled for the rope to pass through to the outside. This hole should just clear the bottom of the rope-groove on the inside, and be filed oval with a small round file, with the arrises at the ends removed to avoid abrading the rope.

Regarding the rope, I have been fortunate in securing some which looks just like the real thing and, moreover, is rustless-steel. At present I am trying another source which may be fruitful. If this comes off, I shall make an announcement in due course but if not, Bowden cable of 16-gauge will make a pretty good substitute, though not quite so realistic in appearance.

A thimble may be made, as drawn, from a strip of thin tinplate about $\frac{3}{16}$ in. wide. Cut it about 3 in. long to provide a hand-grip, and with a mallet, preferably raw-hide, beat the edges over on the rounded edge of a strip of 16-gauge material gripped in the vice. Alternatively the hollow strip may be punched on a lead block using a punch as sketched.

Trim the edges with a file, and then bend round a piece of $\frac{3}{16}$ in. rod in the vice, to form a horse-shoe shape. Cut off to appropriate length, and file the ends to a mitre so that they will meet correctly whenthe bending is finished, which is the next stage.

The end of the rope should be fitted round the thimble, and spliced into itself—if you know how to do that, or have some nautically-minded friend capable ! The joint is then " served," or wrapped with thin wire : fuse wire is just the thing. Failing the splicing, the end should be served and sweated up, but with a minimum of solder ; this is where solder paint is admirable.

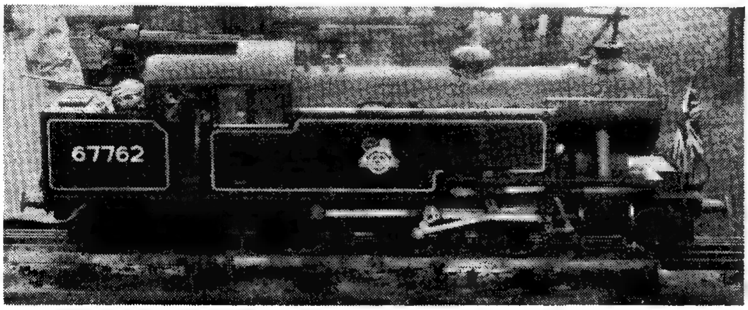
The length of rope required is approximately nine yards ; the inner end is secured by the clamp, of course, and the outer end is passed under and over the last coil or two on the drum.

(*To be continued*)

CLUB DAY at the BLACKGATES TRACK

Reported by " Northerner "

DESPITE pouring rain, the Club Day for visiting societies organised by the West Riding Small Locomotive Society recently was very successful. There were several coach-loads of visitors, and the car-park was full, people having come from as far away as Sunderland and Burton-on-Trent.

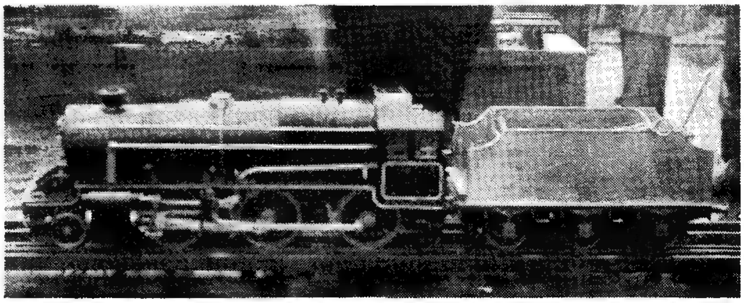


A magnificent engine with a magnificent performance—A. Balmforth's " L.1 " class locomotive in 7¼-in. gauge

Many locomotives were to be seen in the steaming-bay, and many pages could be devoted to describing them. Space being limited, however, we can only deal with a few representative engines in this issue. *The Dalesman*, built to 5-in. gauge by W. Lynch of the home club, was not seen running on the track on this occasion, but this magnificent engine has *started* a load of two tons (in 56-lb. weights, not merely computed) on a gradient of 1 in 200. She won the cup at the Birmingham National Rally last year.

An interesting feature of the loco. is that all the working parts possible, including axle journals, and motion are case hardened. This extra trouble has paid dividends, for after three years really hard work on the track, no signs of wear are to be found. Other builders might well follow the example set by Mr. Lynch, when it is known that their engines will have to endure much prolonged " collar-work."

The first of the reproduced photographs shows a 7¼-in. gauge 2-6-4 tank built by A. Balmforth. This engine weighs 5 cwt., and is a magnificent locomotive for haulage : she was hauling 24 adults round the Blackgates track at a spanking pace with the regulator barely open and the lever well back. What she would really do with an adequate supply of passenger-trucks is open to conjecture !



This well-built " Princess Marina " is the work of R. Walker, of Preston

The engine is of the (former) L.N.E.R. " L.1 " class, and was built from official drawings from the Doncaster works. She is very fully-detailed—for example, all her motion work is fitted with castle-nuts and split-pins,—and is now in her third year of running.

Seen in the second photograph is a *Princess Marina* built by R. Walker, of Preston. She represents three years' work, and is built largely to the official " words and music." However, the boiler differs in having four super-heaters and a tapered back, and in addition the engine is fitted with brakes.

The footplates and tender carry some very neat riveting, and the paintwork is excellently carried out. This was done by stove enamelling with Dulux paint.

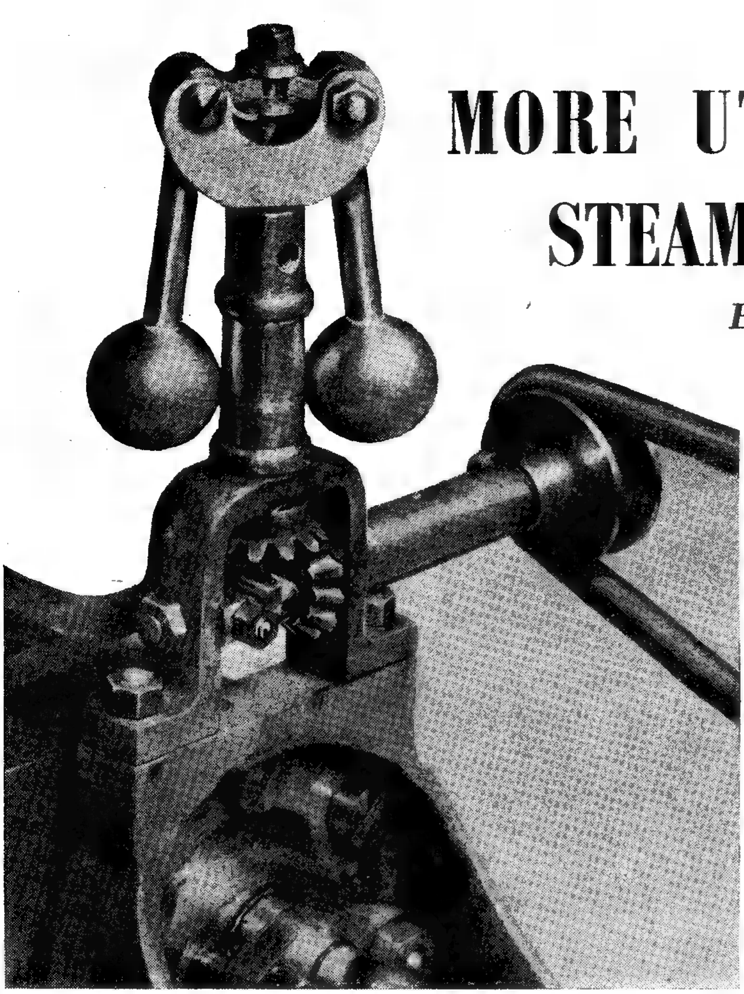
Another locomotive seen was a 5-in. gauge Atlantic built by M. Hedley of the home club. This was a nice-looking, well-built engine, and looks capable of good hard work, although I did not see her actually running on the track. At these visitors' days it is the laudable policy of the organisers not to run their own locomotives until all the visitors' engines have had a chance to show their paces.

A boiler for a 7¼-in. gauge *Royal Scot* was shown by J. M. Swindells of Mexborough. It is of all-riveted construction, correctly caulked ,and with all stays correctly put in. The tubes are expanded in, and the boiler has stood a pressure of 210 p.s.i. in hydraulic test. The locomotive itself is well on the way to completion : the chassis has wheels, side-rods, cylinders, footplating, and parts of the motion assembled ; the tender is completely finished. All patterns, including those for the wheels and cylinders, were made by the builder. I look forward to seeing the whole engine complete, and running, at some time in the future, perhaps at the Blackgates track.

Without any doubt, this track belonging to the West Riding lads is a fine piece of work, and well worth anyone's time and trouble taken in getting there. But not only the " lads " are to be congratulated : the " lasses," too, were doing a grand job of work, in ministering to the inner man. Bless 'em all !

MORE UTILITY STEAM ENGINES

By Edgar T. Westbury



A close-up of the " Unicorn " engine governor

IT is now advisable to make the end cap for the throttle valve, which before parting off, can be used as a screw chuck to hold the body for counterboring and tapping the gland boss. Although it is desirable that the cap should screw in right to the shoulder, I have not shown an undercut, as the narrowest tool one could use would weaken the thread unduly. It should be screwed as close as possible to the shoulder by using the reverse " unthroated " side of the die, the burrs removed by taking a cut up to the shoulder at the crest setting, and the mouth of the bore in the body slightly countersunk with a centre-drill, just sufficient to attain the desired result. The counterbore for the gland is made with an ordinary drill, and tapped with a plug tap; the gland is identical with the end cap except that it is drilled through concentrically, 3/32 in. diameter, and the mouth of the hole bevelled to an included angle of 120 deg., or approximately the same as the drill point.

For the throttle plug, I have recommended nickel-silver, as this is hard and will take a very high finish, which is essential for free working. The larger diameter should fit the bore of the body neatly but freely, and it is not desirable to make it tight with a view to lapping or " grinding in " afterwards. When in place, and the end cap screwed home, it should have a slight end play, and when the gland is screwed in, without packing, it should not increase friction by binding on the spindle.

The body may now be held in the four-jaw chuck for facing the ends and drilling the centre passage. If it is not provided with a chucking-piece, the best thing is to grip it by the centre part, with soft metal packing-pieces on the end bosses to prevent bruising. After drilling half-way and tapering the hole, the work may be mounted on a taper stub-mandrel for similar operations on the other end. The plug may be cross drilled *in situ*, and burrs on this, and also in the bore, carefully removed.

Governor Frame

While the machining of this part is simplified by the use of a casting, it is fairly easy to fabricate, and this makes it possible to machine it all over so that appearance is enhanced. The frame, on the full-size engine, was of cast-iron, and finished by painting, but brass or bronze, finished bright, look well on a model, and are usually preferred by constructors. I built up the frame by first making the stirrup-shaped part from flat material, $\frac{1}{4}$ in. thick by $1\frac{1}{2}$ in. wide, which was held centrally in the four-jaw chuck and turned, inside and out, also drilled for the vertical column, before parting off; the latter part, also the horizontal bearing, were turned from round bar, fitted tightly in place, and silver-soldered, using the minimum amount of solder to avoid clogging up details. No doubt soft-soldering would be adequate if the parts are well tinned before fitting together.

In the drawing of the governor frame, I have shown the gearing and shafts in position, as these parts are very simple individually and do not call for separate detail drawings. With regard to gears, I was quite prepared to make the two 12-toothed mitre bevel wheels by planing out the teeth in the lathe; this would not be difficult in view of their small size, but as it happened, I found that the smallest bevels listed by Bond's o' Euston Road could be adapted quite nicely for the job simply by cutting back the bosses, and they are relatively inexpensive.

Continued from page 309, September 10, 1953.

The vertical shaft is hollow, and in case the task of drilling a $\frac{1}{8}$ in. diameter rod approximately $1\frac{1}{4}$ in. long, through from end to end with a $\frac{1}{16}$-in. drill may seem difficult, it may be found possible to obtain a nice straight piece of $\frac{1}{8}$-in. steel tube to provide a short cut. Incidentally, I have in the past solved the problem of making small hollow shafts by using hypodermic needles, but it would need a pretty large one for this particular job. However, I may say that I found no great difficulty in drilling a hole through this shaft, by chucking it to run dead true, and drilling half-way from either end. The ingredients for success in this sort of job consist of using a sharp drill, running the lathe at top speed, centring truly, applying plenty of lubricant (I use "white suds" or soluble cutting compound), backing out frequently to clear chips, and above all, "making haste slowly." A lever feed tailstock is helpful, but not essential; the same thing applies to a rotating drill spindle.

Fitting the Gears

Owing to the fact that the bosses of the stock gears have to be partially machined away to get them to work within the limited space in the frame, they cannot be grub-screwed to the shafts, and pinning is also difficult or impracticable. The alternative is to use press fits, and as the torque load is not very great, this is quite satisfactory. First, however, a stub mandrel should be turned in the chuck for mounting the gears to face back the bosses. It is a good idea to remove them almost completely and fit steel washers between the gears and the frame; these will help to take the end thrust load which is always present with bevel gearing, and their thickness can be adjusted, to ensure that the gears mesh smoothly. This should be tested out with temporary shafts on which the gears can be pushed fairly easily, to avoid having to press them on and off several times in the course of adjustment.

It will be seen that the lug which takes the pivot of the governor lever is made in the form of a removable eyebolt. This is not in conformity with the prototype, in which this lug was integral with the casting; but my reason for making it in this way is so that the gear may be permanently assembled on the vertical shaft—even sweated on, if need be—before the latter is inserted in its bearing. The other gear, however, must be pressed on after the shaft is inserted from outside, and care must be taken to avoid damaging the tips of the gear teeth in doing so. If it should be necessary to remove the gear afterwards, the removable pivot lug enables a fine pin punch to be inserted through the bolt hole for knocking out the shaft. Incidentally, the possibility of screwing the gears on to their shafts, to simplify assembly, had occurred to me, but this would involve larger diameter shafts, with bearings larger than scale proportions, and it also involves some risk of the gears running out of truth.

The gears should not mesh too tightly, a little backlash being allowed, and on no account should the teeth bottom at the tips. The horizontal shaft is fitted with a brass pulley $\frac{1}{2}$ in. diameter, with a 60 deg. vee-groove; this can be machined all over at one setting, except for facing the outer side. It can either be pinned to the shaft or fitted with a 10-B.A. sunk grub-screw; not one with a protruding head.

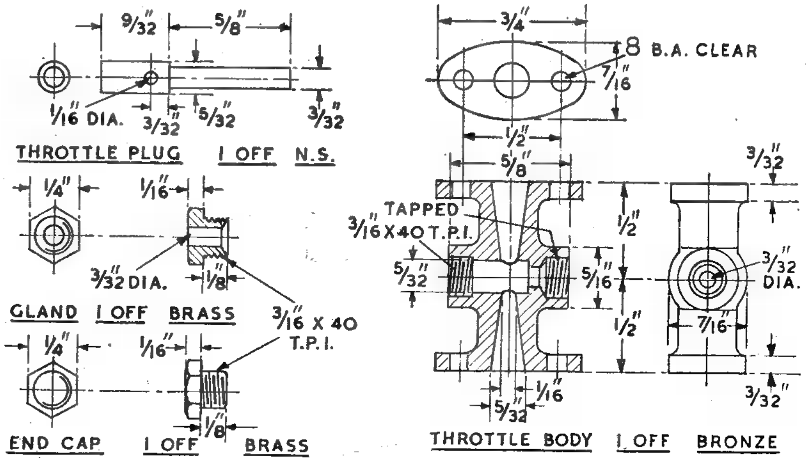
Governor Weights

These can be made in one piece from $\frac{3}{8}$ in. diameter brass rod, if it is chucked truly for turning the ball ends. It is advisable to do this before turning down the shanks, and any of the well-known methods of spherical turning are applicable so long as they produce a shapely result which will satisfy a critical eye. It is important that the two weights should be as near as possible in dimensions and weight. After turning down the shanks to finished size and length, much of the work on the bell cranks can be done before separating the components from the bar. A good policy is to make the two weights either on separate pieces of bar, or on opposite ends of the same bar, so that corresponding operations on them can be kept in step.

Flatten two opposite sides of the boss, either by milling or filing (the use of an adjustable filing rest is just the thing for this sort of job, and saves setting up a complicated milling attachment). At right-angles to these surfaces, a cut can be taken to remove most of the unwanted metal on the outer side of the boss, and the pivot hole may be drilled. The outline of the "toe" can then be marked out on the sides, and filed to shape, leaving a small neck connecting the part to the bar until the last moment, as this makes it much easier to hold in the vice or chuck than would otherwise be possible. It will be found necessary to file a concave radius at the tip of the toe (see plan view) to clear the hub of the collar on the push-rod.

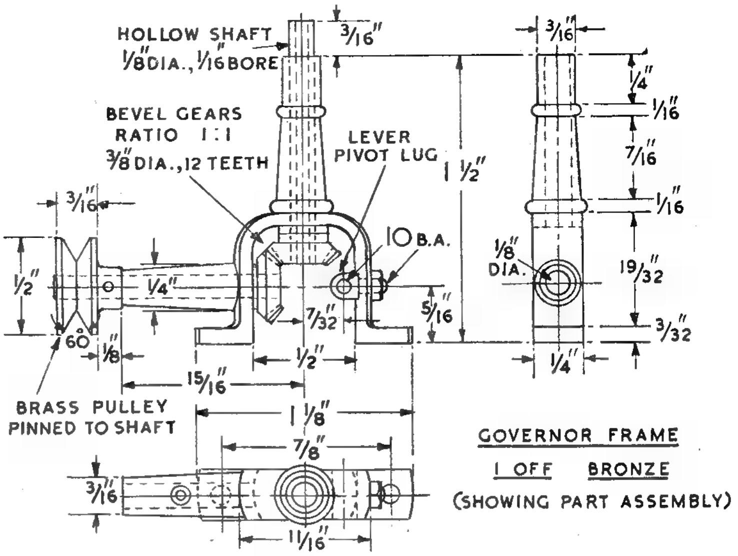
Yoke

The simplest way to make this is to turn a mild-steel collar, [illegible] in. by $\frac{1}{4}$ in. wide, with a $\frac{1}{4}$ in. hole through the centre. This is held edgewise in the four-jaw chuck, or clamped to an angle plate, for drilling and reaming the hole for the shaft, and facing the flat surface. The method I have described previously, of producing a "witness" to locate the hole properly, will ensure that it is truly central both ways. Before cutting away the waste metal at the top of the yoke, the side grooves



may be milled or filed, as this metal is useful in enabling the work to be clamped firmly in a machine or bench vice, without risk of collapsing at the sides. A piece of $\frac{1}{8}$-in. rod should be inserted in the hole for the purpose of checking up the angular location of the work while cutting the groove, and it can also be used when marking out the position of the holes for the pivots. Finally, the unwanted top portion can be sawn away and the lugs neatly rounded off. A 10 B.A. grub-screw can be used to fix the yoke to the vertical shaft, which should have a small flat or dimple to locate the point, and it is permissible to use a headed screw here so long as it does not project excessively.

No detail drawings of the pivot-pins are shown, but I have used specially-made 10-B.A. bolts and nuts for this and other points in the linkage. Do not use ordinary screws, with threads all the way down, as the tips of the threads make a very inadequate sort of bearing. Some constructors may prefer to use plain pins with the ends slightly burred over to prevent their working out; this is quite satisfactory so long as you are certain that the job will never have to be dismantled again! In any case, it is most essential that the pivots should enable all the joints to work perfectly freely, with the minimum friction, but no sloppiness.



GOVERNOR FRAME
1 OFF BRONZE
(SHOWING PART ASSEMBLY)

Push-rod and Collar

The push-rod is a piece of $\frac{1}{16}$ in. diameter steel rod, which must work quite freely through the hollow shaft, and one end is screwed for a short distance to take the internally-threaded collar and its lock-nut. Both the depth and width of the groove in the collar should be sufficient to allow the toes of the governor weights to work freely in them, but without undue play; a little careful fitting may be called for here. The bottom end of the push-rod is rounded off and polished, also it may be case-hardened with advantage.

Governor Lever

In the full-size engine, the push-rod has collars both top and bottom, and the lever is provided with a swivelling fork to work in the groove of the lower collar. In view of the difficulty of fitting these parts in the restricted space, however, I have eliminated the fork and lower collar, and have fitted a hardened pad or "pallet" (I have used this term, as it resembles a type of pallet which has often been used in clock escapements) to take the direct thrust of the rounded end of the push-rod. This very much reduces the bearing area of the parts, and might be found unsatisfactory on a large engine, but it works very well indeed in the model. An inset detail drawing of the pallet is shown in the governor lever drawing, and it is also shown in its normal working position.

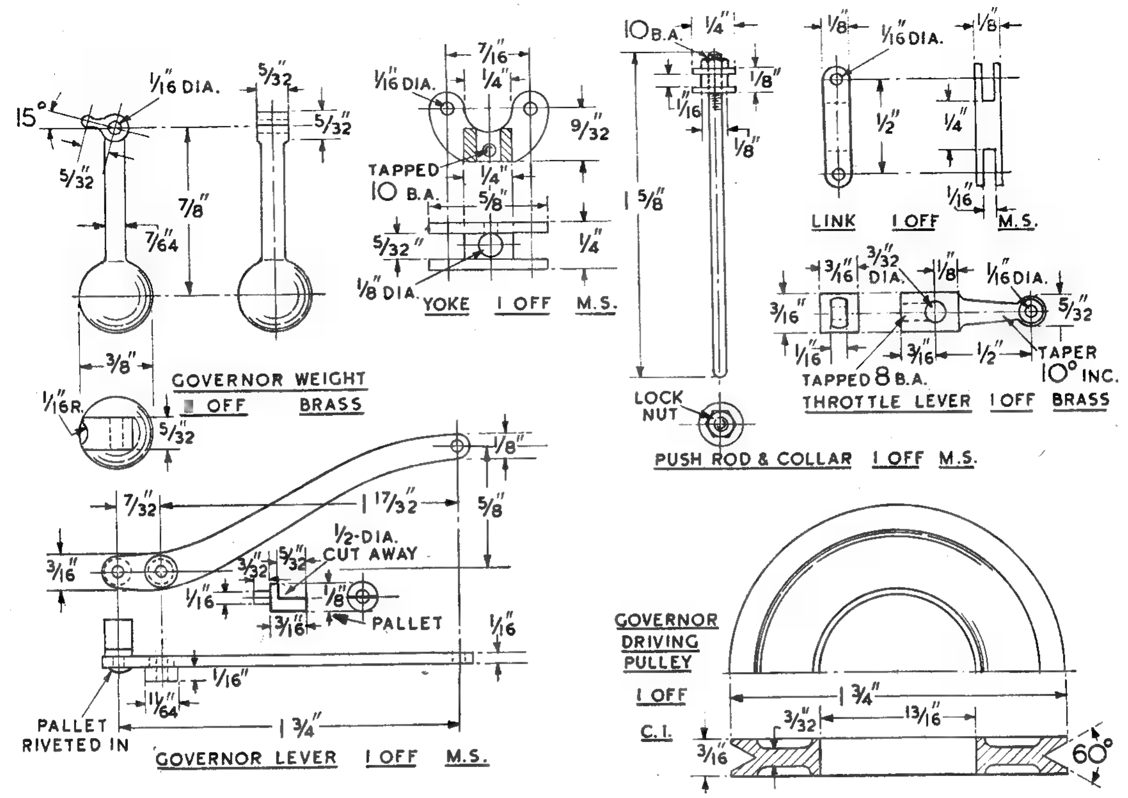
The lever may be cut to the shape shown from $\frac{1}{16}$-in. steel plate, or bent edgewise from $\frac{3}{16}$ in. by $\frac{1}{16}$ in. strip and filed taper; in the latter case, some buckling will probably take place, and the strip will need to be hammered flat, so that it will need cleaning up on the sides afterwards. A boss is riveted into the lever to increase the bearing surface at the pivot or fulcrum; this may be turned with a spigot about 7/64 in. diameter to go through the lever, and just long enough to enable it to be riveted over on the other side; better still, it could be silver-soldered in place.

The pallet is made by turning down a piece of $\frac{1}{8}$ in. steel rod to $\frac{1}{16}$ in. diameter for a length of 3/32 in. and milling or filing a flat on the other part, down to approximately half the diameter. The flat surface should be highly finished, and the spigot is riveted to the inside of the lever, not necessarily very tightly but firm enough to prevent wobble; preferably, it should be capable of turning stiffly for the purpose of adjusting the angle of the flat surface. It should be case-hardened in position; if it is done separately, it will be found difficult to avoid hardening the spigot so as to prevent it riveting over properly. Do not be tempted to use silver-steel for this part, or the push-rod.

Throttle Lever and Link

As at first constructed, the throttle lever was fixed to the spindle with a split clamp, but in view of the small diameter of the spindle, it was found difficult to obtain a really secure grip, and a different form of lever was made, employing the cruder but more effective device of a grub-screw, as shown. The lever can be machined from $\frac{3}{16}$ in. square brass bar, or round bar large enough to square up at the large end, and the other end has a 5/32-in. ball formed on it, and flattened to $\frac{1}{16}$ in. wide on the sides to take the link pivot. After cutting off, it is cross drilled 3/32 in. diameter to fit the spindle, then chucked the reverse way round, and drilled and tapped axially for the 8-B.A. grub-screw.

The link is simply a piece of $\frac{1}{8}$ in. square steel rod, slotted at each end, and drilled for the pivots, which are made as previously described. Here again it is essential to take care with the fitting of these tiny joints to ensure that they work with very little friction. The fulcrum for the governor lever is a slotted 10-B.A. screw which passes right through the tapped hole in the lug with a lock-nut at the back, so that end play can be taken up so as to leave the lever quite free, but without side shake. It may be



found necessary to "set" the lever sideways to line up properly with the throttle linkage.

When erecting the governor gear, it is advisable to insert [redacted] piece of $\frac{1}{16}$-in. rod through the throttle so [redacted] to locate its full-bore position—but don't let it fall through into the steam chest if you wish to avoid having to take off the cover to retrieve it. In the drawing of the governor arrangement, the throttle lever is shown horizontal when the engine is idle, but it has been found that its best position is at about 15 deg. below this, or at "[redacted] o' clock" looking from the spindle end; the collar on the push-rod should be adjusted to obtain this position, the throttle being kept full open, and the grub-screw then tightened. On trial it may be found that some modification of the setting is necessary, but when the best position has been arrived at, the grub-screw of the lever may be located by [redacted] dimple or flat on the spindle. To save having to take down the steam pipe when adjusting the gear, a nick can be cut across the end of the throttle spindle to indicate the full-bore position.

Driving Pulley

It has been found necessary to make a somewhat drastic departure from prototype design here; in the latter, the governor was driven from a vee groove in the flywheel hub, but in the model it was found that the speed obtained in this way was not high enough for effective governor operation. Trials were made with pulleys of different sizes mounted on the hub, and the smallest which would give the desired results was of the dimensions shown here. It is made to a light press fit on the flywheel hub, and should not require any further securing, but it is possible to fit an oblique grub-screw if desired. Perhaps [redacted] spoked wheel might look neater than the blank disc, but this is a matter which can be left to the discretion of individual constructors.

With this pulley fitted, the governor was quite effective in closing down the throttle on [redacted] rise in speed, but unfortunately the weight of the working parts was not sufficient to restore the *status quo* when the speed was reduced by extra load on the engine. The addition of a weight on the governor lever helped matters, but it had to be larger than was desirable for neatness, and the best results were obtained with a light tension spring, taken from an extension of the throttle lever pivot-bolt to an anchor plate secured by one of steam chest nuts. This, of course, is another departure from fidelity, but apparently inevitable if *working* realism is the aim.

In these experiments the governor was driven by [redacted] spiral spring belt, which happened to be the only kind available at the time. From the aspects of both realism and efficiency, [redacted] round leather belt would be much better, but its diameter should not exceed 3/32 in., which is not only below the smallest standard belting size, but also introduces a jointing problem. The nearest approach to an ideal solution would be a p.v.c. belt with heat-welded ends, if [redacted] suitable size of material can be obtained.

(To be continued)

READERS' LETTERS

● Letters of general interest on all subjects relating to model engineering are welcomed. A nom-de-plume may be used if desired, but the name and address of the sender must accompany the letter. The Managing Editor does not accept responsibility for the views expressed by correspondents.

TESTING ENGINES ON OXYGEN—A WARNING

DEAR SIR,—It is felt that I must give a warning to model engineers *not* to use oxygen to run their models for test or any other purpose. Should the oxygen come into contact with any form of oil or grease, an explosion would certainly result, with horrible consequences. Since locomotive cylinders, etc., are usually assembled with some steam oil on them, this is most likely.

This is prompted by a statement by "L.B.S.C." on page 280 of the September 3rd issue, Vol. 109, No. 2728, the right-hand paragraph, in the centre. He says that a Lancashire correspondent tells him that he has tested his locomotive chassis by coupling up to it an oxygen bottle. The correspondent is lucky to have survived to be able to write about it.

Should other locomotive enthusiasts or others with similar models see this note and connect their welding set oxygen bottles to their models, an accident is almost certain to follow. I have myself seen the consequences of the inadvertant use of oxygen instead of an air-cylinder during the war (I am employed on aircraft hydraulics), and the results were not pleasant, I assure you. Although the poor chap was some yards away, he had a long stay in hospital with horrible burns.

Yourse sincerely,

Yeovil. J. CORBETT.

ELECTRICALLY DRIVEN BOATS

DEAR SIR,—With reference to your reader from Hayling Island's queries regarding electrically driven boats, I have had considerable success with them, and have used two 6-volt miniature accumulators (Bassett-Lowke) made by "Exide," with a 24-volt, 5-amp motor consuming 2½ amps at 12 volts; also, a second-hand fan motor of about 1½ to 2 amp consumption specified for 12 volts. This latter motor is about 5 in. long by 3½ in. in diameter, anything smaller will not be adequate unless a gearbox is used. My boat is a cabin launch 4 ft. long, 12in. beam, and is capable of about 4 knots (fast enough); it runs for about 1½ hrs. on one charge.

In a liner or other similar boat, the weight factor is unimportant, as this type of hull usually requires ballast, anyway.

The batteries weigh 9 lb. each, and a 3 ft. 6 in. or 4 ft. hull will take them easily. *Dry batteries* are never a great success, as they will not stand the current consumption, i.e. amps per hour. One motor which I think might be used, and which is often advertised, is a 12-24 volt fan blower motor, *ex*-Government, priced at 15s. or 17s. 6d.

Yours faithfully,

Hatch End. P. L. UFSON.

THOSE ASHES

DEAR SIR,—I greatly enjoyed the "M.E." Exhibition, as I expected. My thanks to you and your staff. I have one complaint. Within a few minutes of hearing over the P.A. that we had won the Ashes, I was told, in your Exhibition, despite the hard work put in by the English team, and told in an almost off-hand manner by a member of the S.M. & E.E. driving a loco THAT HE THROWS THE ASHES AWAY!

Yours in sorrow,

Crawley. G. F. CHELL.

"THE DEPTH OF IT"

DEAR SIR,—In the short article, "The Depth of It," (p. 57, July 9th, 1953), Mr. P. Robinson refers to a "locating bar"—a more expressive name for this weapon, which I have heard, is "bodger." Such a tool, for locating pipe flange bolt holes, may be 18 in. long, 30 deg. bend 4 in. or 5 in. from one end, and pointed at both ends. Made from hexagonal steel, ½ in. A.F.

Yours faithfully,

Preston. A. N. Unknown.

A MECHANICAL MYSTERY?

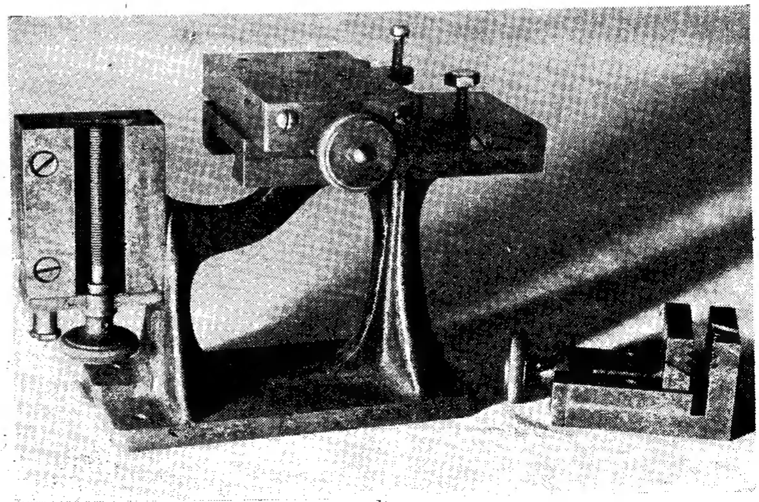
DEAR SIR,—Herewith is a photograph of a piece of machinery. I wish to know what it is, and how to use it.

It came into my possession with an instrument maker's lathe and equipment, but I am not satisfied that it is part of same. In extensive search in books on the lathe, from Plumier 1701, to Perrigo 1936, and every copy of THE MODEL ENGINEER, from 1922 to 1953. I failed to find anything helpful.

In my extremity I turn to you, in the hope that by reproducing the photograph, some of your readers may know the answer.

Yours faithfully,

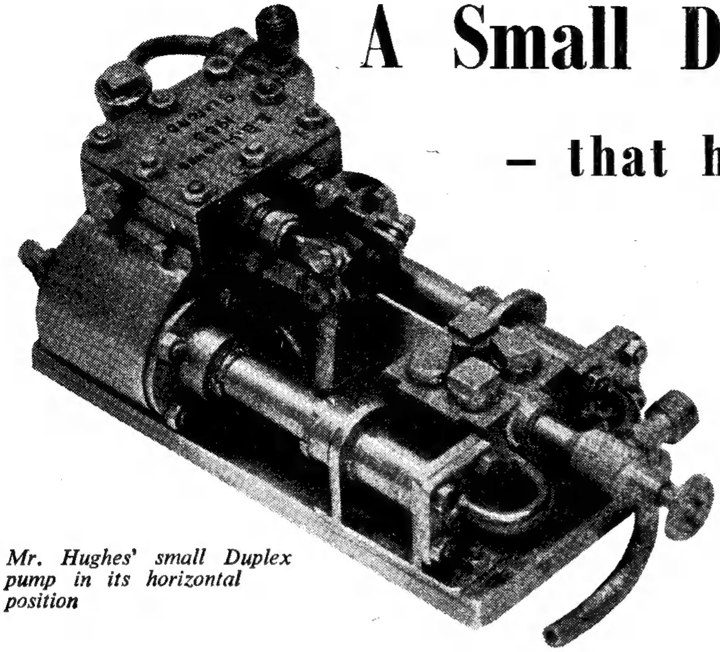
Dublin. H. W. INGRAM.



A Small Duplex Pump

– that had to lie down

By E. B. Hughes



Mr. Hughes' small Duplex pump in its horizontal position

BEING impressed by Mr. Austen-Walton's vertical duplex pump described in these pages some time ago, I wondered if I could not make a similar one, but smaller size, single acting and simpler in detail. I have neither this gentleman's skill nor equipment, so did not intend to attempt to follow his form of construction. True the resemblance between his engine and mine may seem very remote, but having decided to make mine entirely from the scrap-box, rather than search for material in these days of shortages and frustration, as the work evolved it got less and less like the original—so I don't think I shall be sued for infringement of design! A nice bit of brass tube which would ream to $\frac{7}{16}$ in. decided the size of the cylinders (they are half the area of Mr. Austen-Walton's). Two pieces $\frac{3}{4}$ in. long were cut and a top and bottom plate of $\frac{1}{16}$-in. brass had two holes bored to be a tight fit for the tubes, which were then pressed into these two plates. The next job tackled was the "spider."

How It Works

For those who are not familiar with this type of engine, it may be explained that the valve-gear operated by one cylinder actually works the other cylinder, which, of course, means that the steam passages have to be crossed and in addition *one* of the valves must be reversed so that the top port leads to the bottom and the bottom port leads to the top of the cylinder it is crossed to. This crossing and reversing of ports, which ensures that both cylinders run at the same speed and in opposition, entails very complicated drilling and blanking of holes in a casting, but Mr. Austen-Walton's "spider," by utilising tube for the steam passages, reduces the job to a bit of tricky, but not too difficult, tube bending.

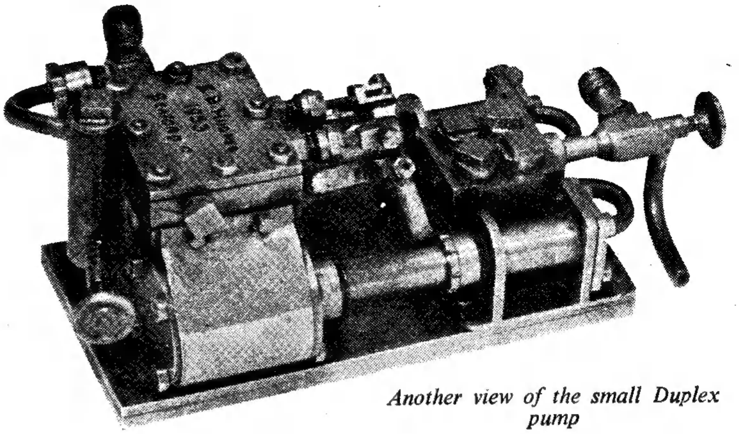
The valve face is a piece of $\frac{1}{8}$-in. brass (I had no thicker material), and on this the ports were drilled. The inlet ports go right through the plate, but the two exhaust ones go only half-way through when they break into a $\frac{1}{16}$ in. hole drilled through the edge of the plate. A $\frac{1}{8}$-in. hole drilled into this passage from the back of the plate connects the two exhausts at the same time the four inlet outlets (a bit of Irish !) were enlarged to $\frac{1}{8}$-in., so on this reverse side we have five holes (like the five in a pack of cards) into which are silver-soldered five short lengths of $\frac{1}{8}$ in. copper tube. The middle one is the exhaust which is left straight, the others are the steam passages which have to be bent so that one pair will cross to the opposite cylinder and the other pair bent so that they will both cross and reverse to the other cylinder. The ends of each pair are silver-soldered into blind holes in a piece of $\frac{1}{4}$ in. square section brass which has already been made a nice fit between the top and bottom plates of the cylinder block and had one face shaped to bed on the outside of the cylinder. The complete "spider" is then bent till it makes a nice snug fit when pushed into the cylinder assembly when it is well sweated to the cylinders (these being at the same time sweated to top and bottom plates). After this operation the valve face is quite solid and secure without any further fixing. Holes are drilled through the cylinder walls top and bottom as usual in such a position that they pass through the brass blocks into the $\frac{1}{8}$-in. tubes. Covers, glands and valve-chest are straightforward jobs, although the latter had to be made of $\frac{1}{8}$-in. × $\frac{1}{16}$-in. plate soldered together, as I had no $\frac{3}{16}$-in. plate and this thickness is required for the valve-spindle glands and slide-valves.

Dished !

The next thing required was the distance-pieces between the cylinders and pumps and here I was definitely "dished"! No material in my junk was of the slightest use for this purpose, so I decided to put the cylinder-block temporally on a bit of $\frac{1}{16}$-in. plate, $3\frac{1}{4}$ in. × $1\frac{1}{2}$ in., whilst I sorted this problem out. This plate looked a bit skimpy, so I soldered a piece of $\frac{1}{8}$ in. to it making a solid base $\frac{3}{16}$ in. thick, and the effect was so pleasing that I realised I should never have the heart to make it into a vertical pump after all, but that horizontal it would remain. A neat webbed angle bracket was fabricated to hold the cylinder block to the base, also a quite small one for the outside end of the block. It was no longer a vertical pump !

Some $\frac{5}{16}$-in. brass tube provided the material for the pump barrels and these are sweated into pre-fabricated stands made by silver-soldering three pieces of $\frac{1}{16}$-in. brass together, and the rear upright of the stands become the backs of

the pump to which the pump covers are bolted. These stands are held to the baseplate by a stud and nut either end, and have slotted holes for adjustment of alignment, and in addition there are four set-screws in the baseplate for height adjustment (a trick from the printing trade), so there is little difficulty in the important job of lining-up. An odd piece of $\frac{3}{4}$-in. square brass was pressed into duty for the clack-box which holds two suction and two delivery valves with a single suction and delivery pipe. A $\frac{1}{8}$-in. copper tube bent to a half-circle is silver-soldered into the pump covers and sweated into the clack-box at the other end. The clack-box and the two pump covers become one complete unit, of course. As the pump is intended to be fitted to the running-board of a locomotive, the suction pipe, and also the exhaust steam, pass through the base. A screw-down pet cock is fitted to the delivery for starting up and there is a displacement lubricator on the steam pipe.



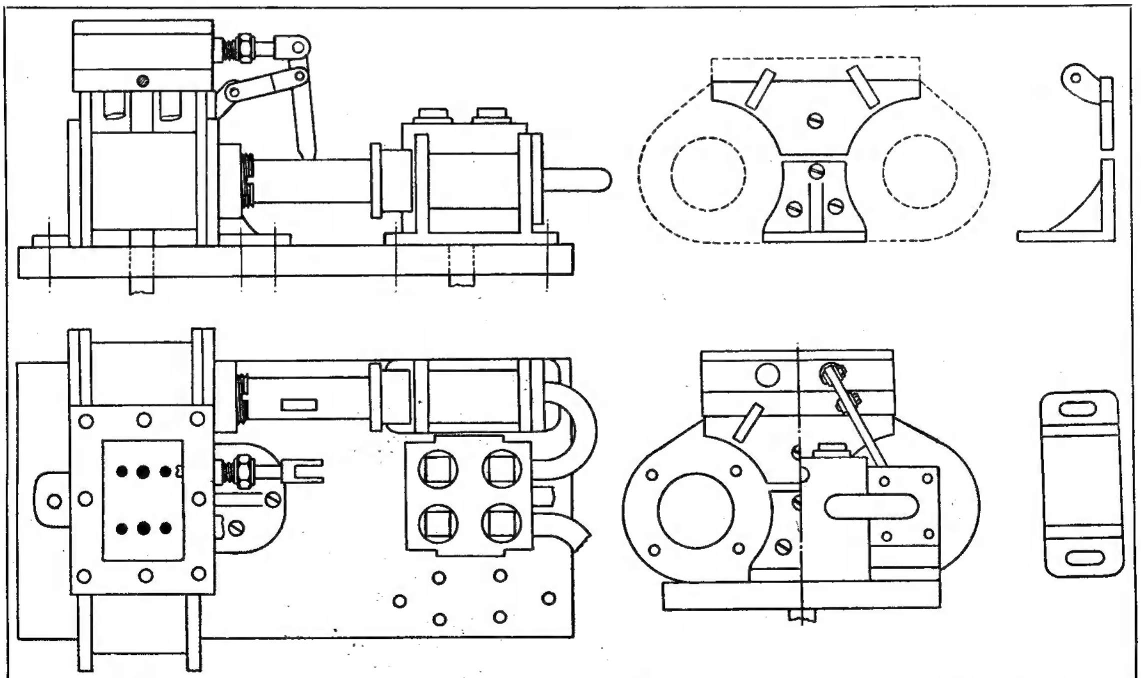
Another view of the small Duplex pump

Simple Valve Gear

The valve-gear has been made as simple as possible and functions well. It oscillates from links anchored on lugs silver-soldered to a plate which is screwed on to the cylinder-block, and the bottoms of the valve operating levers fit into slots in the pump rams. These ram-cum-pistons are brass tube turned to $\frac{1}{4}$ in. diameter and represent the only part of the engine not out of the scrap-box, bye the bye.

There is a lot of satisfaction to be obtained in building an engine from odd bits and pieces—converting valueless scrap into something which, even if open to criticism from the over fastidious, is certainly of some value and use. The scheming required gives an interest that is absent when castings, etc. are used and the work more cut and dried.

This engine, having no heavy mass of metal to heat up, is a quick starter and will run as slowly as 30 strokes or as fast as 70 per min., and will operate down to 10 lb. p.s.i. Such a small engine, where the moving parts are so light and the area of sliding friction so great in proportion to its cylinder capacity, can easily be put out of action if there is a tight spot or any undue



Drawings showing general arrangement of pump; also, main fixing bracket, anchor-link bracket and plan of pump barrel stand with slotted holes.

friction, and I should not like to suggest that this one fed a boiler on its first trial. One of the troubles was the gland packing, the glands being $\frac{5}{16}$ in. (40 thread) on a $\frac{1}{4}$-in. piston; it was tricky work to pack and adjust them so that they didn't blow steam and water or alternatively bind the pistons—they would have been better $\frac{3}{8}$ in., but, unfortunately, I had no scrap for the barrels that would allow the larger thread. Incidentally, my first trial had its comic side. I fixed a new clack on the test boiler (a vertical) with a well-fitted pad secured by two screws, raised steam and had the pump working nicely with the pet valve open. I closed the valve—the pump nearly stopped, fine spray appeared at a union and also round the pad, and the pump slowly resumed work. *I had forgotten to drill a hole for the water to enter the boiler* ! Mr. Austen-Walton claims (and I do not doubt him), that his pump will work down to 12 strokes and practically no pressure, but one cannot expect a similar type engine of half the size to put up an equal performance, even if the workmanship is equal, and this point I do not claim. Considering that the necessary turning was done on the dining-room table by pulling the lathe (a 3 in. JR) over by hand, which is not a very satisfactory method of doing accurate work, I cannot say I am dissatisfied with its performance, which should definitely improve the more the engine is used. The horizontal position makes the motion most attractive to watch when pumping, and I do not regret having to make the engine lie down—in fact, I can recommend the general arrangement to any reader who has a scrap-box that will yield the necessary bits of brass; naturally, size and detail will be dictated by the scrap available. If the barrels and clack-box offend the eye, a cover-plate could be made to fit over these which would make them look more like a casting, no doubt, and perhaps less like a "model," but personally I feel the present tendency to bow to Inspector Meticulous is rather overdone. The sight of a slotted screw is sufficient to cause strong men to faint today, and I have the greatest admiration for the heroes who enter models in exhibitions to be told that a wheel contains one too many spokes or two too many rivets in a seam of fifty ! Inspector M. would collapse when he found a few slotted screws in this pump, and when he couldn't ascribe the pump to any particular manufacturer; still, it works and looks more like a pump than anything else—so why worry ?

WITH THE CLUBS

The Society of Model and Experimental Engineers

The lecture arranged for 7.0 p.m on September 24th, at the Caxton Hall has had to be postponed owing to the absence abroad of Mr. Gooch. In place of this lecture we are substituting a film by Walt Disney on model locomotives. In this, members will see some of their friends and their locomotives "starring." Visitors will be welcome.

Full particulars of the society may be obtained from the Secretary, E.C . YALDEN, M.C., 31, Longdon Wood, Keston, Kent.

Eltham & District Locomotive Society

The next meeting will take place at the Beehive Hotel Eltham at 7.30 p.m. on Thursday, October 1st, 1953, when our vice-chairman Mr. A. Brock will talk on locomotive matters, and general construction; this should be very interesting, as Mr. Brock is a master of his subject and will probably include in his talk, methods employed in the construction of his 5-in. gauge "Adams" locomotive which is well under way.

At the last meeting the rummage sale took place, and as in the past, it was a great success, every article being disposed of except one item, a very interesting model beam engine of 1892 vintage. This in itself created a big item of interest during the evening. Two visitors attended the meeting, and a Mr. Taylor expressed his intention of attending the club's activities. It was generally agreed that a hearty vote of thanks be accorded to Mr. F. Brock our treasurer, for his great assistance in helping the rummage sale to run efficiently and smoothly. Visitors are always cordially invited to attend the meetings.

Hon. Sec.: F. H. BRADFORD, 19, South Park Crescent, S.E.6.

Altrincham Model Power Boat Club

The annual regatta of the Altrincham Model Power Boat and Car Club was held on Sunday, September 6th at Lindow Common, near Wilmslow.

The club were most fortunate in having a lovely windless day and a good attendance resulted with visitors from The Maghull, Bournville, Wallasey and Crosby clubs. Some good times were recorded in the speed events and the Nomination and Steering Events were well supported.

The results were as follows :—

Event No. 1.—Nomination Competition
1st. J. Hinton, Submarine *Felix*: 2.86 per cent. error.
2nd W. J. Davies, Liner *Lucien* 3.16 per cent. error.
Both of the Wallasey Club.

Event No. 2.—5 to 10 c.c. Hydroplanes
1st. D. Innes, *Jo Mac*, Altrincham Club, 47.8 m.p.h.
2nd. W. J. Jones, *Mamba*, Maghull Club, 41.6 m.p.h.

Event No. 3 for the Allen Trophy.—15 c.c. Hydroplanes
1st. Mr. Dalziel, *Niad*, Bournville Club, 46.0 m.p.h.
No second finisher.

Event No. 4.—Steering Competition for Steering Challenge Cup
1st. K. W. S. Turner, Lifeboat, *Elizabeth Rippon*, Altrincham Club, 10 points.
2nd. J. Hinton, Submarine *Felix* Wallasey Club, 8 points.

Event No. 5 for the Machin Cup.—30 c.c. Hydroplanes
1st. F. Westmorland, Altrincham Club. 39.8 m.p.h.

The Brighouse S.M.E.E.

At the meeting to be held on Tuesday, October 6th, Mr. Hinchliffe, of Bradford, will be telling us of his experiences on the recent record-breaking run to Cape Town by car in $8\frac{1}{2}$ days, and will illustrate his talk with a cine film taken on the journey.

We regret that our president, Mr. W. D. Miller, will be unable to be with us for some time owing to illness, but trust he will have a speedy recovery and soon be able once again to join in our activities.

THE MODEL ENGINEER DIARY

September 24th, 25th and 26th.—Tees-side Society of Model and Experimental Engineers.—Exhibition at the Town Hall, Middlesbrough, 2 p.m. to 10 p.m. daily.

September 24th, 25th and 26th.—Nottingham Society of Model and Experimental Engineers.—Exhibition at Victoria Baths, 2 p.m. to 9 p.m.; Saturday 10 a.m. to 9 p.m.

September 26th, 27th, 28th, 29th, 30th, October 1st, 2nd, 3rd.—Southport Model and Engineering Club.—Exhibition at Chapel Street Congregational Halls, Southport.

September 27th.—Southend Model Power Boat Club.—Regatta at Southchurch Park, Southend-on-Sea. Straight running and round-the-pole events.

October 1st, 2nd, 3rd.—Hitchin & District Model Engineering Club.—Exhibition in the Town Hall, Hitchin Herts.

October 9th, 10th.—Chester Model Railway Club.—Exhibition at the Chester Town Hall.

October 19th, 20th, 21st, 22nd, 23rd.—Cambridge & District Model Engineering Society.—Model engineering exhibition at the Corn Exchange, Cambridge.

October 21st, 22nd, 23rd and 24th.—Huddersfield Society of Model Engineers.—Exhibition in the Drill Hzll, Huddersfield. Open from 10.30 a.m. to 10.0 p.m.

The Annual Subscription is £2 2s. 0d., post free, to all parts of the world.

The Managing Editor invites correspondence and original contributions on all small power engineering and electrical subjects. Correspondence and manuscripts should not be addressed to individuals, but to the Managing Editor, THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.